



**USAID**  
FROM THE AMERICAN PEOPLE

CLIMATE CHANGE IN MALI :

# INSTITUTIONAL ANALYSIS OF L'AGENCE DE L'ENVIRONNEMENT ET DU DÉVELOPPEMENT DURABLE (AEDD) AND L'AGENCE NATIONALE DE LA MÉTÉOROLOGIE (MALI-MÉTÉO)

JUNE 2014

This report is made possible by the support of the American people through the U.S. Agency for International Development (USAID). The contents are the sole responsibility of Tetra Tech ARD and do not necessarily reflect the views of USAID or the U.S. Government.



ARCC



African and Latin American  
Resilience to Climate Change Project



Contributors to this report: Mark Freudenberger, PhD<sup>1</sup>; Henri Lo, PhD<sup>2</sup>; and Mohammed Sadeck Boulahya<sup>3</sup> through subcontract to Tetra Tech ARD.

<sup>1</sup> Tetra Tech ARD

<sup>2</sup> Université Cheik Anta Diop, Institut des Sciences de l'Environnement, Senegal

<sup>3</sup> ClimDevConsult – Africa

Cover Photo: Mali-Météo headquarters in Bamako. Credit: Mark Freudenberger.

This publication was produced for the United States Agency for International Development by Tetra Tech ARD, through a Task Order under the Prosperity, Livelihoods, and Conserving Ecosystems (PLACE) Indefinite Quantity Contract Core Task Order (USAID Contract No. AID-EPP-I-00-06-00008, Order Number AID-OAA-TO-11-00064).

**Tetra Tech ARD Contacts:**

**Patricia Caffrey**

Chief of Party

African and Latin American Resilience to Climate Change (ARCC)

Burlington, Vermont

Tel.: 802.658.3890

Patricia.Caffrey@tetrattech.com

**Anna Farmer**

Project Manager

Burlington, Vermont

Tel.: 802-658-3890

Anna.Farmer@tetrattech.com



CLIMATE CHANGE IN MALI:

# INSTITUTIONAL ANALYSIS OF L'AGENCE DE L'ENVIRONNEMENT ET DU DÉVELOPPEMENT DURABLE (AEDD) AND L'AGENCE NATIONALE DE LA MÉTÉOROLOGIE (MALI-MÉTÉO)

AFRICAN AND LATIN AMERICAN RESILIENCE TO CLIMATE CHANGE (ARCC)

JUNE 2014



# TABLE OF CONTENTS

<b>ACRONYMS AND ABBREVIATIONS .....</b>	<b>III</b>
<b>ABOUT THIS SERIES .....</b>	<b>VI</b>
<b>EXECUTIVE SUMMARY.....</b>	<b>VII</b>
<b>1.0 INTRODUCTION .....</b>	<b>I</b>
1.1 METHODOLOGY.....	I
<b>2.0 L'AGENCE DE L'ENVIRONNEMENT ET DU DEVELOPPEMENT DURABLE (AEDD) INSTITUTIONAL ASSESSMENT .....</b>	<b>4</b>
2.1 THE NATIONAL POLICY ON CLIMATE CHANGE.....	6
2.2 AEDD MANDATES AND FUNCTIONS.....	8
2.3 ADAPTATION FUNCTION: ASSESSMENT .....	10
2.4 ADAPTATION FUNCTION: PRIORITIZATION .....	13
2.5 ADAPTATION FUNCTION: COORDINATION .....	14
2.6 ADAPTATION FUNCTION: INFORMATION MANAGEMENT .....	14
2.7 ADAPTATION FUNCTION: CLIMATE RISK REDUCTION.....	15
2.8 ADAPTATION FUNCTION: INSTITUTIONAL SUSTAINABILITY .....	16
2.9 PROGRAMMATIC OPTIONS.....	17
<b>3.0 L'AGENCE NATIONALE DE LA METEOROLOGIE (MALI-METEO) INSTITUTIONAL ASSESSMENT .....</b>	<b>21</b>
3.1 HISTORY OF MALIAN METEROLOGICAL SERVICES .....	23
3.2 MANDATE OF MALI-MÉTÉO.....	24
3.3 SERVICES .....	27
3.4 CHALLENGES .....	47
3.5 PROGRAMMATIC OPTIONS.....	56
<b>4.0 SOURCES.....</b>	<b>70</b>
<b>ANNEX I. CONTACTS.....</b>	<b>72</b>
<b>ANNEX II. MALI CLIMATE FUND.....</b>	<b>74</b>



# ACRONYMS AND ABBREVIATIONS

ACMAD	African Center for Meteorological Application for Development
AEDD	<i>L'Agence de L'Environnement et du Développement Durable</i>
AGCC	Global Alliance Project on Climate Changes
AGRHYMET	<i>Centre Régional du CILSS pour l'Agriculture, Hydrologie et Météorologie</i>
ANAC	<i>Agence Nationale de l'Aviation Civile</i>
APCAM	<i>Assemblée Permanente des Chambres de Commerce d'Agriculture au Mali</i>
ARCC	African and Latin American Resilience to Climate Change
ASECNA	<i>Agence pour la Sécurité de la Navigation Aérienne en Afrique et à Madagascar</i>
CA	<i>Conseil d'Administration de l'Agence Mali Météo ou AEDD</i>
CCAFS	Climate Change Agriculture and Food Security a Flag Ship Programme of the CGIAR
CEWS	Climate and Early Warning Services
CGIAR	Consultative Group on International Agricultural Research
CILSS	<i>Comite Inter-Etats de Lutte Contre la Sécheresse</i>
CLICOM	Climate with Computer
CLIDATA	Climate and Data
CLIMBASE	Climate Database
CMDT	<i>Compagnie Malienne pour le Développement des Textiles</i>
CNCC	National Climate Change Committee
CNE	National Committee for the Environment
CNSC	<i>Cadre national des services climatologiques</i>
CSCR	<i>Cadre Stratégique de Croissance et de Réduction de la Pauvreté</i>
CSEVRCC	<i>Cadre Stratégique pour une Economie Verte et Résiliente aux Changements Climatiques</i>
DMN	National Directorate of Meteorology
DNACPN	National Directorate of Sanitation and Pollution and Wastes Control
DNM	<i>Direction Nationale de la Météorologie of the Ministry of Equipment and Transport</i>
EBT	<i>Evaluation des besoins technologiques</i>
ECMWF	European Centre for Medium Range Weather Forecast



ENI-ABT	National School of Engineers
EPA	Etablissement Publique National à caractère Administratif
EVRC	<i>Economie Verte et Résiliente de Climat</i>
CGIAR	Consultative Group on International Agricultural Research
GLAM	<i>Groupe Local d'Assistance Météorologique au Monde Rural</i>
GTPA	<i>Groupe De Travail Pluridisciplinaire d'Assistance Agro météorologique</i>
ICAO	International Civil Aviation Organization
ICRISAT	International Crops Research Institute for the Semi-Arid Tropics
IEDRO	International Environmental Data Rescue Organization
IER	Institute of Rural Economy
ILWAC	<i>Projet sur la Gestion Intégrée de Terre et de l'Eau pour l'Adaptation à la Vulnérabilité et au Changement Climatique</i>
IPCC	Intergovernmental Panel on Climate Change
IPR-IFRA	Rural Polytechnic Institute
IRI	International Research Institute for Climate and Society
IQC	Indefinite Quantity Contract
Mali-Météo	<i>L'Agence Nationale de la Météorologie</i>
MPTFO	Multi-Partner Trust Fund Office of United Nations Development Programme
MRV	Monitoring-reporting-verification
NBA	Niger Basin Authority
NCEP-NOAA	National Centre for Environmental Prediction of the National Oceanic and Atmospheric Administration
ORTM	Malian National Television Station the national television station
OSS	<i>Observatoire du Sahara et du Sahel</i> (Sahel and Sahara Observatory)
PANA	Programme National d'Actions d'Adaptation
PDESC	<i>Plan de Développement Economique, Social et Culturel</i>
PEP	Precipitation Enhancement Program
PGRNCC	Natural Resource Management Project in the Context of Climate Change
PLACE	Prosperity, Livelihoods and Conserving Ecosystems
PNCC	<i>Politique Nationale sur les Changements Climatiques</i>
PNPE	<i>Politique Nationale de Protection de l'Environnement</i>
ROSELT	<i>Réseau d'Observatoires de Surveillance Ecologique à Long Terme</i>



SEVIRI	Spinning enhanced visible and infrared imager
SGBD	<i>Système de Gestion de Base de Données</i>
SIMPLAST	<i>Société Industrielle Moderne de Plastique</i>
SNPGRC	<i>Stratégie Nationale de Prévention et de Gestion des Risques de Catastrophes</i>
SNCC	National Strategy on Climate Change
SNGIE	World Bank National System of Integrated Management of Environmental Information
TMA	Tanzania Meteorological Agency
TNA	Technological Needs Assessment
UNDP	United Nations Development Programme
UNFCCC	United Nations Framework Convention on Climate Change
USAID	United States Agency for International Development
WMO	World Meteorological Organization



# ABOUT THIS SERIES

## **THE STUDIES ON CLIMATE CHANGE VULNERABILITY AND ADAPTATION IN WEST AFRICA**

This document is part of a series of studies produced by the African and Latin American Resilience to Climate Change (ARCC) project that address adaptation to climate change in West Africa. Within the ARCC West Africa studies, this document falls in the subseries on Climate Change in Mali. ARCC has also produced a subseries on Climate Change and Water Resources in West Africa, Agricultural Adaptation to Climate Change in the Sahel, and Climate Change and Conflict in West Africa.

## **THE SUBSERIES ON ADAPTATION TO CLIMATE CHANGE IN MALI**

Upon the request of the United States Agency for International Development (USAID), ARCC undertook the Mali series of studies to increase understanding of the potential impacts of climate change in rural Mali and identify means to support adaptation to these impacts. Other documents in the Climate Change in Mali series include: Climate Vulnerability Mapping, Impact Modeling of Selected Agricultural Adaptive Practices, Key Issues in Water Resources, Organizational Survey and Focus Groups of Adaptive Practices, Expected Impacts on Pests and Diseases Afflicting Livestock, and Expected Impacts on Pests and Diseases Afflicting Selected Crops.



# EXECUTIVE SUMMARY

The African and Latin American Resilience to Climate Change (ARCC)<sup>1</sup> project is a vehicle for the United States Agency for International Development (USAID) to invest more effectually and consistently in adaptation programming and activities that support economic growth, democratic governance, health, human rights, and education. The purpose of this institutional analysis of the *Agence de l'Environnement et du Développement Durable* (AEDD) and the *Agence Nationale de la Météorologie* (Mali-Météo), carried out in close collaboration with USAID/Mali, is to identify the capacity and needs of these two institutions and to provide specific recommendations to strengthen these two agency's responses to climate change.

The ARCC Mali Institutional Assessment of the AEDD and Mali-Météo was structured around a field visit to Mali from January 11–24, 2014. USAID requested that the “National Adaptive Capacity Framework” (NAC), designed by the World Resources Institute, and the USAID “Project Design Sustainability Analysis Tool” structure the key issues and questions for this assessment.

The NAC identifies a fundamental set of national-level functions that all countries will need to perform if they are to adapt effectively over time to climate change. In order to identify opportunities and priorities for building adaptive capacity and implementing key adaptation and mitigation activities, the framework can be used to assess how well institutional functions are being performed. By using this framework that focuses on the adaptation functions of AEDD and Mali-Météo, the assessment provides a “snapshot” that can help improve adaptation and mitigation responses in Mali. This assessment looked at the capacity and needs of these two institutions to carry out five core functions: *assessments* to guide decision-making; *prioritization* to respond to climate change issues; *coordination* of disparate actors from the national to the local level; *information management* in support of adaptation and mitigation measures; and *climate risk reduction* priorities and actions. The assessment team added a sixth function, *institutional sustainability*, a missing element in the NAC framework but one that USAID highlights as essential in its “Project Design Sustainability Analysis Tool.”

## L'AGENCE DE L'ENVIRONNEMENT ET DU DEVELOPPEMENT DURABLE

The AEDD was founded on July 12, 2010, with the mandate to coordinate national environmental policy in Mali and to contribute to the transformation of the National Strategy on Climate Change (SNCC) into specific actions on the ground. AEDD informs and educates policy makers, the administration, and the general public on all matters pertaining to the environment, including policies and programs to respond to climate change. Under the aegis of the *Ministère de l'Environnement et de l'Assainissement* (Ministry of Environment and Sanitation), the young agency is progressively making itself known as the focal point of national environmental and climate change debates within complex Malian policy-making frameworks.

---

<sup>1</sup> Tetra Tech ARD implements the African and Latin American Resilience to Climate Change under the USAID/Washington D.C.-based Prosperity, Livelihoods, and Conserving Ecosystems (PLACE) Indefinite Quantity Contract (IQC) Task Order. Tetra Tech ARD receives assistance from partners ACDI/VOCA, the World Resources Institute, and the Center for International Earth Science Information Network, Earth Institute, Columbia University.



In a nutshell, AEDD is the agency responsible for the coordination and implementation of the National Policy for Environmental Protection (*Politique Nationale de Protection de l'Environnement* [PNPE]); within this overall structure, it ensures harmonization among many other sub-policies. Currently, AEDD focuses much, but not all, of its attention on coordination around the national climate change policy enacted in July 2011 known as the *Politique Nationale sur les Changements Climatiques* (PNCC) or, as well known in international English speaking circles, the SNCC. AEDD works closely with Mali-Météo, the weather and climate services agency.

After signing the United Nations Framework Convention on Climate Change (UNFCCC) and the Kyoto Protocol, Mali put in place in 2007 a *Plan d'Action National d'Adaptation* (PANA). Since then, Mali has tried to strengthen its institutional framework and policy instruments so that various ministries, agencies, and partner organizations can more effectively contribute to climate change adaptation and mitigation. While AEDD is designed as the institution responsible for monitoring the implementation of these many policies, the operationalization of the policies is the responsibility of mainline ministries and governmental agencies. Because of the differentiation of its roles and responsibilities, AEDD has not yet established a unique identity within the bureaucracy. Like many environmental agencies around the world, AEDD will not have the authority to effectively carry out its coordination function without control over the dispersal of significant funding for climate change projects. For this reason, its mandate as the Secretariat designated to set up and manage the United Nations Development Programme (UNDP) Multi-Partner Trust Fund Office (MPTFO) Mali Climate Fund is absolutely central in its search for identity and legitimacy within governmental institutions and with the public-at-large. If AEDD can manage the Mali Climate Fund well, and if other contributors sign up to further support it, the agency has a bright future; however, if the Mali Climate Fund does not make headway, AEDD risks becoming another case of a government institution with a fine mandate on paper but not enough resources to execute its mission. So far, the AEDD is making steady progress in establishing the Climate Fund by creating the management committee, launching preliminary communication and outreach activities, and developing an annual work plan.

The ARCC Mali Institutional Assessment team presents a range of options to expand the capacity of the agency. The recommended options employ the NAC and USAID assessment frameworks structured around the six institutional functions below:

- **Assessment:** Support the creation of an Information and Data Management Charter that spells out how intersectorial information on climate change issues is to be collected, housed, and used by government and the general public. Invest in the expansion of the data management system being implemented by the World Bank National System of Integrated Management of Environmental Information (SNGIE) to cover the entire country.
- **Prioritization:** Strengthen the mainstreaming of “climate-proofing” into mainline ministries to go beyond the current agriculture, water, and livestock production sectors. Expand climate-proofing into the *Plan de Développement Economique, Social et Culturel* (PDSEC) regional-, cercle-, and commune-level plans. Support the expansion of the AEDD into the eight regions so that public education, coordination, and monitoring of climate change adaptation and mitigation can occur at this scale.
- **Coordination:** Contribute to the mapping of climate change interventions in Mali. Long-term support for updating the data bases and accompanying maps will be needed for years to come. Expand climate vulnerability mapping at the regional level but build the capacity of regional and local stakeholders to participate in the process. International funding agencies need to decide whether to inject contributions into the Mali Climate Fund. Donor agencies face two choices—they can either obtain a seat at the AEDD table by contributing to this basket fund, or they can design, implement,



and monitor regional and local climate change adaptation and mitigation projects through the specific multi-lateral or bilateral project cycle of each donor.

- **Information Management:** Support the AEDD Climate Fund communication and outreach plan. Provide complementary funding to the AEDD Information Center, which is currently the object of expected World Bank support, but expand these information centers into the regions. The debate on climate change is excessively concentrated in Bamako. Concerted efforts are needed to get information out to the regions and down to the level of communes.
- **Climate Risk Management:** Support the decentralization of AEDD to the regional level. Expand the capacity of the agency to build the climate change “reflex” into all sectors of society while recognizing that the agency is itself still in its early stages. AEDD staff are passionate about their mission and need support to expand into the regions.
- **Institutional Sustainability:** Contribute to the preparation of an AEDD long-term business plan to help prepare the agency for longer-term financial autonomy. Reinforce the technical skills of current AEDD staff, but support the development of partnerships with international academic and research institutions to provide targeted short-term training to address internal knowledge needs.

## L'AGENCE NATIONALE DE LA MÉTÉOROLOGIE

The *Agence Nationale de la Météorologie* is a financially autonomous parastatal agency created in November 2012 out of the former Central Department of Meteorology of the Ministry of Equipment and Transport. With this new legal status, Mali-Météo is required and empowered to raise its own financial resources from both the public and private sectors. The young agency confronts numerous challenges to meet its mandate of providing reliable and timely weather-water-climate information and analysis to a wide range of public and private information users.

The agency provides a range of services to the general public, particularly to the agricultural sector and to the civil aviation world through the continuing contractual relationship with the *Agence pour la Sécurité de la Navigation Aérienne en Afrique et à Madagascar* (ASECNA) and the *Agence Nationale de l'Aviation Civile* (ANAC). The Mali-Météo administrative and financial institutional structures provide information and analysis on a fee-for-service basis. The agency has identified some new markets for services as well as clients willing to pay for weather information and analysis. However, the agency lacks the internal capacity to provide information and analysis to a public demanding and willing to pay for increasingly sophisticated weather and climate services. This situation will only be compounded by the retirement of the majority of its experienced technical staff within the next seven years.

Mali-Météo is now at a crossroads. Unless it develops a long-term business strategy and action plan for capturing and effectively meeting the demand for its services from public and private sector clients, the agency will not become financially sustainable. Even though the Government of Mali at this time cannot cover the entire recurrent and capital improvement costs of this strategic public services agency, it remains very supportive of the mandate of Mali-Météo. The international development community cannot be expected to cover recurrent costs of operations and maintenance. Only by developing and effectively implementing a cost-recovery plan can Mali-Météo survive into the 21<sup>st</sup> century as a viable advisory service provider of integrated weather-water-climate data and analysis.

The international development community can play a timely role at this juncture to help Mali-Météo increase its capacity to become a strong and independent technical advisory service providing integrated weather data and climate information to a wide spectrum of audiences. Strategic assistance to rebuild and modernize existing weather stations is urgently needed. Some funding agencies are prepared to provide this strategic investment. For instance, the World Bank *Projet de Résilience face aux Catastrophes*



*dans le Sahel* plans to support through the *Comite Inter-Etats de Lutte Contre la Sècheresse* (CILSS) the rehabilitation of the Mali-Météo and the Burkina Faso meteorological services as well as strengthen the capacities of regional institutions like the African Center for Meteorological Application for Development (ACMAD), Niger Basin Authority (NBA), Centre Régional du CILSS pour l'Agriculture, Hydrologie et Météorologie (AGRHYMET), and the Sahel and Sahara Observatory (OSS). A summary of this expected support is presented in Figure 24 of this report. Similarly, through the Spanish government supported AFRIMET Climate Services Fund, some much needed technical support is available to West African meteorological institutions for capacity building and global observation systems.

While Mali-Météo is likely to receive much-needed inputs of capital and technical capacity building, these projects are not equipped to assist Mali-Météo to develop strategies to mobilize financial resources sustainably starting from within the Malian private and public sectors. International funding agencies can provide targeted and short-term assistance to meet this key need. For instance, to our knowledge, no funds have been set aside for protection, scanning, and public dissemination of the valuable national weather archives reaching back to 1895.

Through the use of the NAC and USAID assessment frameworks summarized above, the ARCC Institutional Assessment team recommends the following options:

- **Assessment:** Immediately rescue the highly vulnerable Mali-Météo weather archives dating back to 1895. Digitize and store these documents in national and international databases and expand public access to these valuable datasets. Climate modelers especially need this highly site-specific weather data to render climate models more rigorous. Complete the USAID-financed Impact Evaluation of the Agro-Meteorological Program carried out in part by the University of South Carolina, and utilize this information to help redesign this innovative program. Rehabilitate the current network of radar stations, synoptic stations, and agro-climatic stations. Introduce and test automated weather stations as a complement to the existing manual system of weather data collection. Construct an urgently needed data transmission link between the ASECNA Weather Information Center at the Bamako-Senou airport and both the ANAC and the Mali-Météo headquarters so that real-time data from synoptic stations and international weather observation systems can be used for weather forecasting and weather alerts.
- **Prioritization:** The timing is right for the bilateral and multilateral development partners of Mali-Météo to consult and coordinate with each other on the most appropriate ways to contribute to the long-term viability of Mali-Météo. Through inter-donor coordination mechanisms in Mali, support could be provided for the long-term institutional growth of Mali-Météo – an institution central to risk management, sustainable development, and poverty alleviation in a changing climate. Technical assistance financed from within the Government of Mali and external sources is needed to increase the skill level of the Mali-Météo research staff to interpret and disseminate climatological analysis as well as support the preparation of a Staff Capacity Improvement Plan for present staff in addition to a Recruitment Strategy to replace staff soon reaching retirement. Options should be explored for diversifying the provision of climate and weather analysis by the private sector and primarily by retired but still active and skilled former staff from Mali-Météo itself. Support is needed to rehabilitate and expand the sparsely situated weather station network of meteorological satellite receiving stations, weather radar stations, synoptic surface observation stations, and principle and secondary agro-climatic stations per criteria of the World Meteorological Organization.
- **Coordination:** At times, ministries and agencies within the Government of Mali poorly understand Mali-Météo's institutional mandate. Mali-Météo should be encouraged to clarify its role in providing weather and climate analysis, especially in regard to the AEDD. Mali-Météo should set up a Climate Sciences Committee to coordinate research that Malian and international researchers and research centers carry out. Despite the perception of many that Mali-Météo should provide free weather



services and analysis as a public good, provision of data and analysis must fit into an appropriate fee-for-service system. As an autonomous weather services agency, Mali-Météo must cover its recurrent costs.

- **Information Management:** The national and international weather services are increasingly capable of generating an enormous amount of weather-related information; however, the Mali-Météo weather station network is largely outmoded and dilapidated. As noted above, the international donor community can contribute to the renewal of the system so important to the generation of ground-truthed data that is needed for global climate forecasting and modeling. Mali-Météo may need short-term technical assistance to help it prepare funding proposals to the Mali Climate Fund to repair the existing infrastructure and to strengthen the analytical capacity of its staff. Rigorous weather and climate analysis depends not only on the interpretative capacity of well-trained staff, but also on up-to-date computing and data-management facilities. Investment in hardware and software procurement for Mali-Météo is much needed, but so is specialized training for Mali-Météo meteorologists. The impact of investments in Mali-Météo must be measured. Rigorous cost-benefit and impact evaluation assessments must be carried out to justify present and future investments in upgrading the Mali-Météo infrastructures and analytical capacity. Unless communication and outreach by Mali-Météo to the general public and targeted clients in the private and public sectors are improved, investments will amount to very little.
- **Climate Risk Management:** The recommendations listed above all lead to the central conclusion that Mali-Météo's strongest contribution to climate change risk reduction would be to provide timely, accurate, and sophisticated weather information and weather-climate analysis to a wide range of stakeholders. The recommendations describing the urgent needs to rehabilitate existing weather stations; to expand the weather station network; and to increase the capacity of staff to collect, analyze, and disseminate weather-related information all fit into a package of contributions needed to prepare better Mali to adapt to climate change events and risks.
- **Institutional Sustainability:** The recommendations listed here will contribute little to the long-term viability of Mali-Météo, unless the agency can cover recurrent costs of infrastructure and personnel. Investment in Mali-Météo could make an enormous contribution to the long-term viability of Mali-Météo by providing short-term technical assistance to help the agency prepare a long-term (10-year) cost recovery strategy and business plan accompanied by a detailed short-term action plan. There is high demand for Mali-Météo weather data and climate analysis from the general public and government but also from the private sector. These interest groups are prepared to pay for Mali-Météo weather and advisory services. A business plan should be accompanied by a market analysis of who can pay how much for these services. The international development community should continue to encourage the Government of Mali to subsidize the Mali-Météo costs of weather and climate data collection and advisory services, yet this action must be accompanied by rigorous cost-benefit analyses. For instance, questions might be raised about whether the high expense of the Precipitation Enhancement Program (cloud seeding) is justified from a scientific perspective, regardless of the program's political popularity. Perhaps Mali-Météo should be encouraged and assisted to submit proposals to the Mali Climate Fund to help pay for capital improvements and the development of a strong cost recovery strategy.

Table 5 in the concluding section succinctly summarizes the priority options that the ARCC Mali Institutional Assessment team recommends.



# 1.0 INTRODUCTION

Climate change is a cross-cutting challenge that will affect development trajectories both directly through biophysical impacts, and indirectly through a variety of causal pathways. Consideration of climate change and climate variability affects how the world plans and reacts to development challenges, particularly in decision making that is expected to be robust in the long term. While development activities often aspire to meet long-term goals, they frequently focus on meeting short-term targets. These challenges are particularly acute in developing countries like Mali, which are confronted by severe weather events (both drought and heavy seasonal flooding), long-term decreasing precipitation, increased temperature extremes, and shorter rainy seasons.

The Sahelian countries like Mali have confronted highly variable climatic conditions throughout history in the arid and semi-arid regions. Complex and dynamic coping strategies have evolved over time to manage the risks of an inherently volatile physical environment in the various agroecological zones of the country. In considerable detail, the extensive literature on drought and desertification in Mali describes the impacts of weather on both society and nature. This assessment does not review this rich literature, because it is summarized in many other places. However, recent assessments like the ARCC Mali Climate Vulnerability Mapping Assessment highlight the vulnerabilities that certain parts of the country currently face and are most likely to confront in the decades to come (USAID, 2014). These studies help countries design policies and programs to respond to the inexorable impacts of climate change and the many expected outcomes affecting livelihood systems.

Institutions like AEDD play a key role in coordinating the responses of the state, civil society, the private sector, and the international development community to climate change and the many associated environmental and societal impacts. The ARCC Mali Institutional Assessment thus investigates how well this young agency not only meets the difficult task of raising awareness around complex climate change issues, but most importantly, how well it coordinates numerous actors around a common but enormously challenging problem. Central to the debate on how to adapt and mitigate the impacts of climate change is the role of meteorological services. This issue has been extensively discussed in the ARCC West African Climate and Early Warning Services (CEWS) study (USAID, 2013). The ARCC Mali Institutional Assessment goes into much more depth by describing how the Mali-Météo has long provided weather information to the aviation industry, government decision makers, and the general public. However, the central question is how well the new agency responds to the new and heavy demands multiple actors place on it at the international, national, and local levels.

## 1.1 METHODOLOGY

The purpose of the ARCC Mali Institutional Assessment, carried out in close collaboration with USAID/Mali, is twofold: 1) to perform an institutional analysis of capacity and needs within Mali-Météo and AEDD; and 2) to provide specific recommendations for investment within these two agencies to strengthen institutional capacity in Mali to address climate change.



### 1.1.1 Assessment Objectives and Methods

The institutional analysis methodology is derived from the framework of climate vulnerability assessments of the World Resource Institute's "National Adaptive Capacity Framework" (NAC) and the USAID "Project Design Sustainability Analysis Tool."

The NAC framework is used to assess institutional capacity at the national level, with a particular focus on government (WRI, 2012). The NAC identifies a fundamental set of national-level functions that all countries will need to perform if they are to adapt to climate change effectively over time. In order to identify opportunities and priorities for building adaptive capacity and implementing key adaptation and mitigation activities, the framework can be used to assess how well institutional functions are performed. In using a framework that focuses on the adaptation functions of the AEDD and the Mali-Météo, the assessment provides a "snapshot" that can help improve adaptation and mitigation responses over time in Mali.

The NAC framework examines five core functions that are required to effectively respond to adaptation challenges: *assessments* to guide decision-making, *prioritization* to respond to climate change issues, *coordination* of disparate actors from the national to the local level, *information management* in support of adaptation and mitigation measures, and *climate risk reduction* priorities and actions. The assessment team added on a sixth category, *institutional sustainability*, a gap in the NAC framework but a function that USAID highlighted as essential in its "Project Design Sustainability Analysis Tool." This last criteria explores whether or not the respective institutions have the support to assure long-term financial viability. The NAC Framework and the USAID Project Design Sustainability Analysis Tool define the terms for these broad rubrics in the box that follows.

#### DEFINITION OF NATIONAL ADAPTIVE CAPACITY FRAMEWORK KEY INSTITUTIONAL FUNCTIONS

- **Assessment:** The process of examining available information to guide decision-making on climate change adaptation and mitigation.
- **Prioritization:** Assigning special importance to particular issues, areas, sectors, or populations through engagement of a wide range of stakeholders in a transparent fashion.
- **Coordination:** Concerted actions by disparate actors at multiple levels, both within and outside of government, to respond to climate change and adaptation programming priorities.
- **Information Management:** Collecting, analyzing, and disseminating knowledge in support of climate adaptation and mitigation activities.
- **Climate Risk Reduction:** Identifying risks that are specific to a given priority, evaluating the full range of options for addressing these risks, and then selecting and implementing risk-reduction measures.
- **Institutional Sustainability:** Capacity to generate support of multiple actors for the mission and mandate of the institutions contributing to climate change preparedness and to assure long-term financial viability.

### 1.1.2 Team Composition

The ARCC Mali Institutional Assessment was carried out in Mali from January 11–24, 2014. The team consisted of:



- Mark Freudenberger: Senior Associate, Tetra Tech ARD. Mr. Freudenberger is a regional planner by training with more than 30 years of experience working in Sahelian countries and Madagascar in the field of natural resource management as well as land tenure and property rights.
- Henri Mathieu Lo: Professor, Institute des Sciences de l'Environnement, Université Cheikh Anta Diop de Dakar. Mr. Lo is a specialist in institutional responses to climate change adaptation and mitigation in West Africa.
- Mohammed Sadeck Boulahya: Meteorologist. Former Director General of the African Centre of Meteorological Applications for Development and currently senior advisor to ClimDevAfrica, with more than 35 years of experience managing weather-water-climate services institutions in Africa at the national, regional, and continental level.

### 1.1.3 Strengths and Limitations

In general, the two-week field study unfolded under excellent conditions. Thanks to the advance protocol preparations by the USAID/Mali mission, AEDD and Mali-Météo were available and eager to provide background documentation and the time to meet with the assessment team. The meetings with AEDD and Mali-Météo corresponded with preparations for the annual governing board meetings of both institutions, so many staff were available and primed for in-depth reflections on the present and future states of the agencies. Within the limited two-week timeframe, the assessment team met a wide variety of actors familiar with the roles and functions of both agencies. The list of those encountered is presented in Annex I. USAID/Mali met with the ARCC team for informative entry and exit briefings and personally introduced the team to the senior management of AEDD and Mali-Météo. Even though two national holidays occurred during the two-week mission, the assessment team profited from the days off to work with the Mali-Météo staff to help pick up some of the precious and fragile weather archives scattered on the basement floor and place them on new shelves. While the assessment team visited Mali-Météo meteorological stations at Sotouba and at the Bamako-Senou airport, there was not enough time in the full schedule to visit other synoptic and agro-climatic stations in the country.



## 2.0 L'AGENCE DE L'ENVIRONNEMENT ET DU DEVELOPPEMENT DURABLE (AEDD) INSTITUTIONAL ASSESSMENT

The *Agence de l'Environnement et du Développement Durable* (AEDD) was founded on July 12, 2010 with the mandate to coordinate national environmental policy in Mali and to contribute to the transformation of the National Strategy on Climate Change (SNCC) into specific actions on the ground<sup>2</sup>. AEDD informs and educates policy makers, the administration, and the general public on all matters pertaining to the environment, including policies and programs to respond to climate change. Under the aegis of the *Ministère de l'Environnement et de l'Assainissement* (Ministry of Environment and Sanitation), the young agency is progressively making itself known as the focal point of national environmental and climate change debates within complex Malian policy-making frameworks.

**FIGURE 1. AEDD OFFICES IN  
DOWNTOWN BAMAKO**



Source: Mohammed Boulahya

---

<sup>2</sup> The *Agence de l'Environnement et le Développement Durable* was created by the Loi N10-027 of July 12, 2010 as an *Etablissement Publique National à caractère Administratif* (EPA).



The Government of Mali ascribes to a wide, at times contradictory, and often bewildering plethora of international and national environmental policies. In a nutshell, AEDD is the agency responsible for assuring the coordination and implementation of the National Policy for Environmental Protection (PNPE) and within this overall structure, for ensuring harmonization among many other sub-policies. Currently, AEDD focuses much, but not all, of its attention on coordination around the national climate change policy enacted in July 2011 and known as the *Politique Nationale sur les Changements Climatiques* (PNCC), well known in international English-speaking circles as the National Strategy on Climate Change (SNCC)<sup>3</sup>. AEDD works closely with Mali-Météo, the weather and climate services agency assessed in considerable detail in the following chapter.

After signing the United Nations Framework Convention on Climate Change (UNFCCC) and the Kyoto Protocol, Mali put in place a *Plan d'Action National d'Adaptation* (PANA) in 2007. Since then, Mali has tried to strengthen its institutional framework and policy instruments so that various ministries, agencies, and partner organizations can effectively contribute to climate change adaptation and mitigation. While AEDD is designated as the institution responsible for monitoring the implementation of these many policies, mainline ministries and governmental agencies are responsible for their operationalization. Because of the differentiation of roles and responsibilities, AEDD struggles to create its unique identity. Like many environmental agencies around the world, without control over a firm and significant amount of funding, AEDD will not have the authority to carry out its coordination function effectively. For this reason, its mandate as a Secretariat tasked with setting up and managing the Mali Climate Fund is central in its search for legitimacy and acceptance within governmental institutions and the public-at-large. The Multi-Partner Trust Fund Office of United Nations Development Programme

**FIGURE 2. MEETING WITH AEDD TEAM WITH ARCC INSTITUTIONAL SPECIALIST HENRI LO (FAR RIGHT) AND TEAM LEADER MARK FREUDENBERGER (FAR REAR LEFT).**



Source: Mohammed Boulahya

## STRATEGIC VISION FOR THE MALI CLIMATE FUND

According to the United Nations Development Programme – Mali Climate Fund, the purpose of the Mali Climate Fund is “to increase the resilience of ecological, economic and social systems to climate change by incorporating priority policies and initiatives in the most vulnerable sectors. The reduction of greenhouse gas emissions by promoting win-win strategies for clean development is a secondary objective, although Mali is country with low carbon emissions. Improving capacities for national research is also emphasized as a means to more effectively manage risks and the impact of climate change.” (Mali Climate Fund Factsheet – MPTFO, 2013)

<sup>3</sup> The translation into English of French nomenclature is fraught with pitfalls. For the purpose of this report, the French nomenclature and associated acronyms generally will be used to avoid linguistic confusion. For instance, the citation for the national environmental policy is best referred to as the *Politique Nationale de Protection de l'Environnement* (PNPE).



(MPTFO) has established national climate funds to combine financing from bilateral and multilateral sources as well as from the public and private sectors in other countries. With an initial contribution from the Government of Sweden, the Mali Climate Fund is one of the first operational national climate funds on the African continent. If AEDD can effectively manage the Mali Climate Fund, and other bilateral and multi-lateral agencies sign up to further support it, the agency will have a bright future. However, if the Mali Climate Fund does not make headway, AEDD could become a government institution with a fine mandate on paper but little to show in terms of action.

## **2.1 THE NATIONAL POLICY ON CLIMATE CHANGE**

The PNCC, the core of Mali's response to climate change, was signed in July 2011. It receives financial support from the European Union Delegation through the framework of the Global Alliance Project on Climate Changes (AGCC). In conjunction with the more concrete National Climate Action Plan (PANC), the PNCC was finalized through a Norway-financed consultative process engaging government agencies, civil society, and the private sector. The box on the following page summarizes the eight policy orientations and strategic axes of this policy.



## **POLICY ORIENTATIONS AND STRATEGIC AXES TOWARD CLIMATE CHANGES IN MALI**

### **Eight Political Orientations (POs)**

- PO1.** The implementation of a proactive and better-organized governance of responses to climate change
- PO2.** The promotion of integration of climate change issues into policies and sectorial strategies and into the planning of national and territorial development
- PO3.** The reinforcement of climate change adaptation
- PO4.** The prevention and management of risks and natural disasters
- PO5.** The promotion of greenhouse gas mitigation
- PO6.** The strengthening of research for the development, extension, and transfer of technologies, as well as the generation of information and relevant data
- PO7.** The information, public awareness-raising, training, and the reinforcement of skills in regards to climate change
- PO8.** The promotion and the reinforcement of international and sub-regional cooperation

### **Eight Strategic Focuses**

- Strategic Focus I:** Adoption and implementation of the *Cadre Institutionnel National Changements Climatiques*
- Strategic Focus II:** Organization and promotion of access to financing for climate change responses
- Strategic Focus III:** Reinforcement of national and research capabilities regarding climate change
- Strategic Focus IV:** Reinforcement of information and awareness-raising on climate change
- Strategic Focus V:** Reinforcement in monitoring Mali's climate
- Strategic Focus VI:** Encouraging the consideration of climate changes in sectorial policies
- Strategic Focus VII:** Encouraging the consideration of climate changes at the territorial level
- Strategic Focus VIII:** Incentivizing the private sector to participate in the national effort in regard to climate changes



## 2.2 AEDD MANDATES AND FUNCTIONS

AEDD is one of the essential levers for converting the Malian climate change policy agenda into action. It was founded in 2010 with the status of Government-Owned Establishment of an Administrative Nature (EPA)<sup>4</sup>. It is a young agency that is progressively making itself known, but is in a particularly critical phase of negotiation for its place and role in the structure of environmental and climate governance in Mali. Its main mission is to ensure coordination in the implementation of Mali's PNPE and ensure the integration of the environmental dimension in different policies, laws, and projects in the field. AEDD performs the function of national secretariat on climate change (*Comité National Climat*) and assures a critical position in the National Council on the Environment (*Conseil National de l'Environnement*.)

The origins of AEDD came from a study published in June 1999, titled, “*Etude Nationale Prospective 2025*” (ENP) that sought to create an “enhanced environmental framework” as the main foundation of a strategy for sustainable growth and poverty alleviation. This study suggested that an agency like AEDD contribute not only to climate change adaptation and mitigation, but also to the decades-long fight against desertification and other transnational negative climate effects (République du Mali, 1999). Following its creation in 2010, AEDD developed a strategy and action plan linked to the PNPE. For each year, the annual work plan clearly establishes activities as well as allocations of human resources and the budget. The AEDD governing board reviews this work plan annually.

The AEDD mission is summarized below.

### AEDD OBJECTIVES FOR 2014

AEDD will focus on the mobilization of financial resources around climate change frameworks, the integration of climate change issues within local-level development planning, the elaboration of a national strategy of sustainable development, and communication for environmental citizenship.

(Mali Web, January 15, 2014).

### AEDD MISSION

- Reinforce the skills of stakeholders involved in the implementation of the PNPE.
- Monitor financial mechanisms and the mobilization of funds.
- Ensure the coordination and monitoring of the execution of international conventions, agreements, and treaties ratified by Mali.
- Support the integration of the climate change dimension into development programs and projects as well as land-development schemes through the preparation of guides for consistency of environmental action and support or advice for local authorities.
- Collect data and produce statistics regarding the environment and sustainable development.
- Disseminate results of research on climate change and sustainable development.

Source: AEDD, n.d.

<sup>4</sup> Best noted within Malian legal terminology as an *Etablissement Public National à caractère Administratif* (EPA).



The implementation of the PNPE is now at the verge of starting up after the hiatus of the national political crises of 2012/2013. AEDD primarily receives support from the Government of Mali, the Swedish Cooperation, the Dutch and German foreign assistance agencies, the European Union, and the United Nations Development Programme. The German government recently has begun supporting a project focusing on the integration of climate change adaptation into sectorial policies in addition to supporting the execution of national environmental strategies through the reinforcement of management functions of AEDD. The World Bank is financing another important project that began January 1, 2014 and addresses climate change in the Kayes and Kolikoro regions. World Bank financing may contribute to the Mali Climate Fund, which is anticipated to support mainstreaming of climate change into government

program planning and operations while also supporting the creation of a “green economy” resilient to climate change. The *Cadre Stratégique pour une Economie Verte et Résiliente aux Changements Climatiques* (CSEVRCC) presents the principles of the Climate Fund.

AEDD has five departments with support from accounting and personnel offices. Forty-five staff now work for AEDD. The text box on this page presents the agency’s five functional departments.

The AEDD Governing Board (*Conseil d'Administration*) met in February 2014 to define its major priorities for the year. The priorities listed in the text box above indicate the opportunities and challenges confronting the agency. As noted throughout this report, the agency recognizes the need to better engage with the country beyond the capital city of Bamako. At more than any time since its creation, the return of greater political stability offers the agency more opportunities to work in Mali’s regions, cercles, and communes.

## AEDD DEPARTMENTS

- Département Partenariats et Actions Internationales
  - *Section Accords Multilatéraux sur l'Environnement*
  - *Section Partenariats et Mobilisation des Ressources Financières*
- Département Environnement et Développement
  - *Section mise en œuvre du Développement Durable*
  - *Section Evaluations Environnementales*
- Département Etude et Planification
  - *Section Etudes et Recherche*
  - *Section Planification*
- Département Communication, Formation et Documentation
  - *Section Communication*
  - *Section Formation et Documentation*
- Département Gestion de l'Information Environnementale
  - *Section Système d'Information Environnementale*
  - *Section Surveillance Environnementale*



## 2.3 ADAPTATION FUNCTION: ASSESSMENT

### NATIONAL ADAPTIVE CAPACITY FRAMEWORK KEY QUESTIONS

**Assessment:** How effective is the AEDD at examining available information to guide decision-making on climate change adaptation and mitigation? How has the AEDD contributed to climate change vulnerability assessments? To what extent have national vulnerability and impact assessments been conducted?

The AEDD contributes to the coordination of Mali's climate change preparedness by promoting, reviewing, and disseminating the results of assessments. Even though AEDD has actively participated in recent debates about the state of the environment through the *Observatoire du Sahara et du Sahel*, dialogue and debate around climate change impacts and responses go back to at least 2000. Climate scenarios have been derived from national weather data from Mali-Météo as well as international meteorological institutions. These scenarios informed the design of the PANA 2007.

The AEDD mandate does not allow it to implement research programs that monitor various ecosystem parameters, which is the job of specialized agencies like the Mali-Météo or the mainline ministries. However, AEDD can strongly advocate for the development of international and national partnerships with institutions better equipped to carry out baseline environmental studies and on-going monitoring of changing ecological and socio-economic realities. In November 2013, AEDD received 72 land-use maps documenting the impact of climate change on various parameters, such as forest cover. AEDD will implement the second phase of the *Observatoire du Sahara et du Sahel* (OSS) project, *Projet sur la Gestion Intégrée de Terre et de l'Eau pour l'Adaptation à la Vulnérabilité et au Changement Climatique* (ILWAC). This phase will greatly expand its capacity to interpret and communicate the climate change situation in Mali.<sup>5</sup> AEDD has worked closely with a coalition of government and academic institutes to set up four biophysical and socioeconomic observatories (*Réseau d'Observatoires de Surveillance Ecologique à Long Terme [ROSELT]*) at strategic sites to track the impact of environmental factors — including climate change — on ecosystems and livelihoods.<sup>6</sup> The chosen sites are: Bourem, Baoulé, Delta du Niger, and Sikasso (see Figure 3 in the following pages). These observatories will contribute to the National Environmental Information Management System (SNGIE). The SNGIE is a tool to aid decision makers, and its main product is a State of the Environment report. This report will inform the Mali Climate Fund priority setting.

Experts interviewed for this assessment noted that the environmental data used for the formulation of programs and projects in Mali is dated and has not been validated in the field. Some observers suggest that maps need to be more rigorously ground-truthed; others complained that environmental analyses fail to adequately cover the entire country and that they generally lack new information about socioeconomic realities. With poor baseline data on the environmental conditions of Mali, assessing the impact of environmental and climate change initiatives and the adaptive capacity of local communities

---

<sup>5</sup> For a full description of this important research initiative, see the OSS website for this activity (<http://www.oss-online.org/fr/ilwac>). The final report describes in considerable detail the climate situation in Mali and the methodological orientations used in preparing the maps (please visit their website at: <http://www.oss-online.org/sites/default/files/projet/Rapport-final.pdf>).

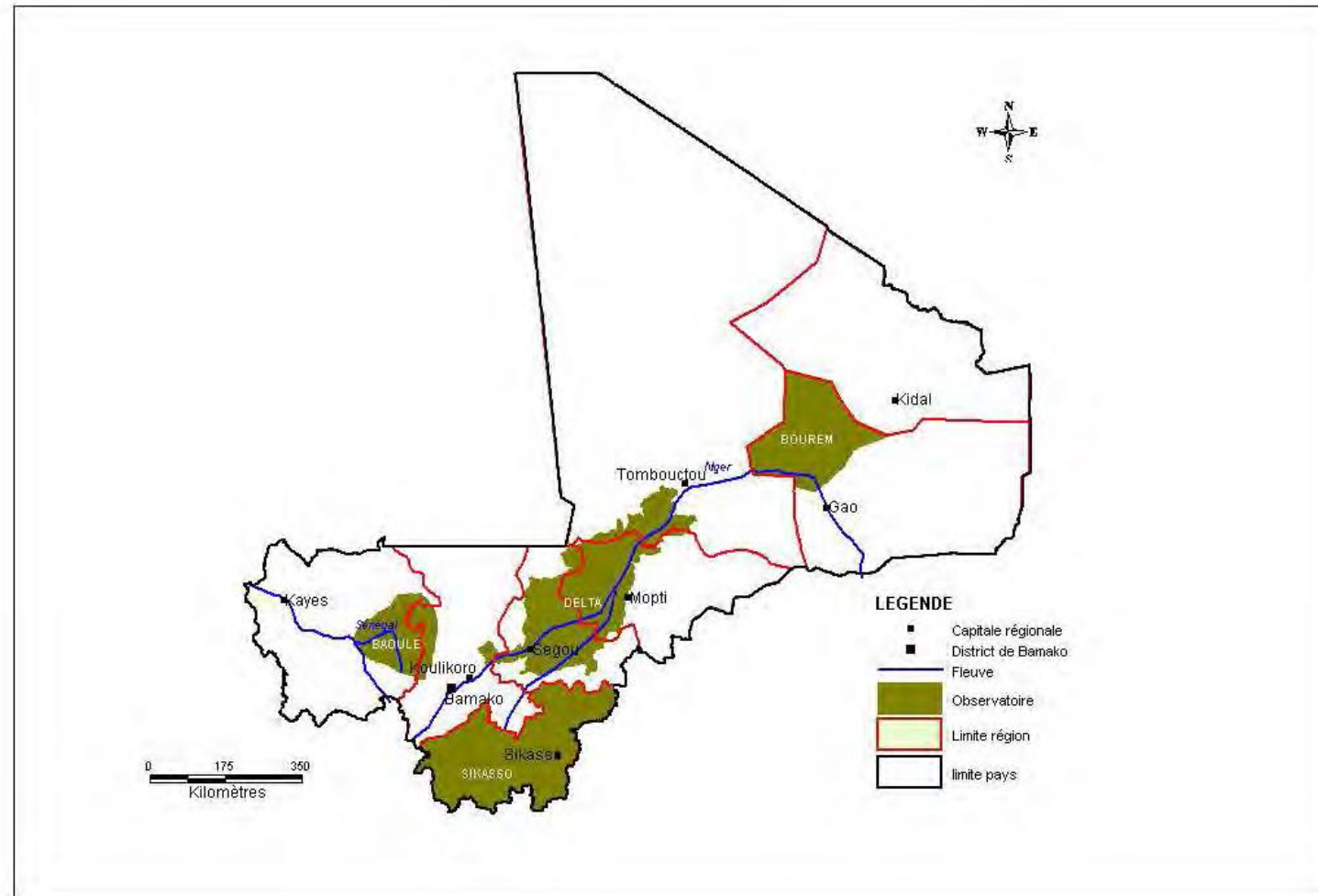
<sup>6</sup> The OSS describes the Réseau d'Observatoires de Surveillance Ecologique à Long Terme in greater detail at this website: <http://www.oss-online.org/sites/default/files/fichier/01.pdf>



would be empirically difficult. To compound the analytical challenges, organizations carrying out field research have not created sufficient institutional synergies around research priorities, data collection methods, or data retrieval systems. The four national ROSELT observatories are a very good start for monitoring change over time. But the question remains whether sufficient commitment exists to finance long-term monitoring of ecological and socioeconomic realities. International funding agencies could provide long-term support to this initiative either through the Mali Climate Fund or through bi-lateral and multi-lateral agreements.



**FIGURE 3. MAP OF LOCATIONS OF ENVIRONMENTAL OBSERVATORIES**



Source: *Observatoire du Sahara et du Sahel*, n.d.



## 2.4 ADAPTATION FUNCTION: PRIORITIZATION

### NATIONAL ADAPTIVE CAPACITY FRAMEWORK KEY QUESTIONS

**Prioritization:** The capacity of the AEDD to assign special importance to particular issues, areas, sectors, or populations through engagement of a wide range of stakeholders in a transparent fashion. What is the role of the AEDD in national priority setting for climate change adaptation? To what extent have national priorities for adaptation been established?

Since its creation in 2010, AEDD has tried to increase the level of governmental awareness regarding the cross-cutting nature of environmental issues in Mali. It also has undertaken communication and outreach initiatives to explain how climate change affects the economic performance of the country, primarily among decision makers and civil society based in Bamako. The institution has faced a great challenge trying to explain the impacts of climate change in a country so large and characterized by many different agroecological regions.

AEDD is responsible for the coordination of environmental and climate policies and the integration of “climate proofing” into sectorial policies of the mainline ministries.<sup>7</sup> At this level, AEDD has been frustrated; national sectorial reviews have failed to show progress in climate proofing. To date, the climate change dimensions only have been integrated into the policies and programs of the forestry and health sectors. Despite the enthusiasm and mandate of the agency, it is not yet obtaining the traction it needs for adjusting ministerial priorities to environmental and climate change realities. The reasons are many, but with 703 communes to be covered by climate mitigation and adaption program planning — and with limited state personnel and financial resources at its disposal — AEDD is considerably hampered in meeting its mandate.

Over the past decade, Mali also has prepared a wide array of strategic policy documents and action plans that affirm the importance of prioritizing resilience to climate change at the subnational level. Yet to date, the projects established to help communes integrate climate change considerations into their local development plans (*Plans de Développement Economique, Social et Culturel* [PDESC]), have not led to anticipated results. For instance, the Natural Resource Management Project in the Context of Climate Change (PGRNCC) policy document calls for revision and harmonization of the 703 commune plans. To date, only 14 have been reviewed with a climate change perspective.

Nevertheless, AEDD has recorded encouraging results in this short time span. It has influenced strategic frameworks like the *Cadre Stratégique pour la croissance et la réduction de la pauvreté* (CSCR) and thus has cut a path of recognition within the Malian environmental governance sphere. This document, for example, spells out a 2012-2017 roadmap for Mali to build a green economy and greater resilience to climate change (International Monetary Fund, 2013). Through AEDD’s annual action plan, it has placed priorities on the sustainable management of water, agriculture, energy, and forestry, as well as on carrying out research on environmental and socioeconomic realities especially for the most vulnerable populations. These priorities will be those of Mali Climate Fund.

---

<sup>7</sup> For the purposes of this assessment, we use term “climate-proofing” to mean, “Identifying risks to a project due to climate change impacts, both current and future, and ensuring that changes are implemented within the project cycle to reduce the risks to acceptable levels and thus making the project resilient to climate change.” (Sveiven, 2010:5)



## 2.5 ADAPTATION FUNCTION: COORDINATION

### NATIONAL ADAPTIVE CAPACITY FRAMEWORK KEY QUESTIONS

**Coordination:** The capacity of the AEDD to facilitate concerted actions by disparate actors at multiple levels, both within and outside of government, to respond to climate change and adaptation programming priorities. What is the role of the AEDD in coordinating responses to climate change? To what extent is the climate change coordination mechanism assigned to the AEDD functioning?

Mali is one of the few countries in West Africa to have implemented a coherent framework of climate change policies and committees. The PNCC, which has been adopted by government, dovetails well with the national strategic growth and poverty reduction policy, CSCR. Additionally, a national strategy for its implementation, the SNCC, is in place, as well as an action plan, the PNAC. These strategic instruments are accompanied by consultative mechanisms like the National Committee for the Environment (CNE) and the National Climate Change Committee (CNCC). Several other platforms also generate reflection and exchange on climate change relative to policy documents, bolstered by technical support from the National School of Engineers (ENI-ABT), the Institute of Rural Economy (IER), the Rural Polytechnic Institute (IPR-IFRA), and the University of Bamako.

AEDD facilitated many of the discussions that led to the preparation of these policy documents. The discussions may seem interminable, yet they have raised the consciousness of governmental authorities. AEDD currently has the staff and the financial autonomy it needs in order to continue to be the active voice for climate change policy debates. It also has the mandate to review the commune development plans and work with communes to integrate the climate change dimension into all development activities at the local level. However, the AEDD lacks the financial support and the staff to work even at the level of the eight regions in Mali. Unless it builds a regional presence in an era of decentralization, it will lack the ability to influence the outcomes of investments in climate adaptation and mitigation at the regional and local level.

## 2.6 ADAPTATION FUNCTION: INFORMATION MANAGEMENT

### NATIONAL ADAPTIVE CAPACITY FRAMEWORK KEY QUESTIONS

**Information Management:** Collecting, analyzing, and disseminating knowledge in support of climate adaptation and mitigation activities. What is the prescribed role of AEDD in knowledge management around climate change? To what extent is the AEDD an information clearinghouse?

Despite the passion of the new and vibrant AEDD to respond to the complex challenges of climate change in Mali, the decision makers within the agency and the broader government lack accurate and up-to-date information on climatic impacts. Especially at the subnational level, policy makers know little about how climate change is affecting urban and rural livelihoods outside of Bamako. Few people discuss in a rigorous fashion how climate change is linked to struggles and conflicts over natural resources. At this time, AEDD has no subnational presence because of a lack of sufficient funding commitments to operate offices beyond Bamako. While it has a mandate to be present at the regional and communal level, it presently cannot feed up-to-date information about local-level realities into the policy-making



process. While mainline ministries have a more operational presence in the regions, AEDD still needs to play a coordination role at the regional level around climate adaptation and mitigation programming. AEDD executives are only too well aware of this constraint; however, at this point AEDD lacks the finances and the staff to have even a modicum of regional presence.

AEDD is beginning to put in place a library and database for environmental information. The documentation center falls under the supervision of the Environmental Information Management Department. Thanks to expected funding from the OSS to the ROSELT network of environmental observatories, the documentation center is beginning to be implemented. World Bank funding is also expected to strengthen the documentation center. The websites for *Ministère de l'Environnement et de l'Assainissement* are well organized and appear to be updated regularly with useful policy papers, government documents, and other background information.

AEDD has developed a communications and outreach strategy for various audiences; it publishes a magazine called “*Notre Environnement*” and is the Ministry’s implementation arm for national environmental days like the *Quinzaine de l'Environnement 2013*.

The information AEDD produces is sometimes difficult to access due to poor organization of the documentation center. At this time, there are no publically available computers to access the internet; nor is there an electronic catalogue of AEDD’s library holdings. Most publications on climate change dynamics are written in English. Few AEDD staff speak or read English well enough to handle the nuanced technical literature in English.

## 2.7 ADAPTATION FUNCTION: CLIMATE RISK REDUCTION

### NATIONAL ADAPTIVE CAPACITY FRAMEWORK KEY QUESTIONS

**Climate Risk Reduction:** Identifying specific risks to a given priority, evaluating the full range of options for addressing these risks, and then selecting and implementing risk reduction measures. What is the role of the AEDD in climate risk reduction? To what extent has climate risk reduction been assessed for priority interventions? To what extent are climate change adaption programmatic interventions being implemented on the ground?

From a broad conceptual and normative perspective, the climate change preparedness framework for Mali is quite sophisticated. The major challenge confronting Mali is to translate fine words into action at the local level. If the activities described in the *Politique Nationale sur les Changements Climatiques* were to be carried out in full, one could argue that Mali would be well on its way to adapting to climate change and also putting in place mitigation measures. But the lofty language of the PNCC hides the reality that only a few coordinated financial mechanisms contribute to effective action at the regional and local level. At the local level, the consultative framework exists to develop climate-proofing measures (government-established forums called CROCSAD, CLOCSAD, and CCOCSAD) through the commune planning and implementation process, but the financial resources do not exist to transform ideas into action. In many ways, Mali, like many countries in the developing world, remains dependent on the vagaries of international development financing through multi-lateral, bi-lateral, nongovernmental humanitarian agencies, and foundations.

While the Government of Mali is attempting to institute decentralization and devolution to the regions and communes, new governance structures are woefully understaffed and underfinanced. The regional and local planning and implementation capacity was cited to the ARCC Mali Institutional Assessment team as the central constraint to prepare for the presently unfolding realities of climate change. Even



when commune development plans are written, the administrative and bureaucratic infrastructure are terribly limited for such a huge and poor country confronted by secessionist tendencies. That said, the ARCC team noted a constant refrain: that technical expertise and financial resources must be transferred downward to the regions and communes. Climate change adaptation and mitigation cannot occur unless education, training, and applied research become better rooted in local realities.

## 2.8 ADAPTATION FUNCTION: INSTITUTIONAL SUSTAINABILITY

### NATIONAL ADAPTIVE CAPACITY FRAMEWORK KEY QUESTIONS

**Institutional sustainability:** Capacity to generate support of multiple actors for the mission and mandate of the institutions contributing to climate change preparedness and assure long-term financial viability. What is the financial state of the AEDD? Does it have the institutional support to assure long-term financial viability?

AEDD is in its infancy and, faced with the competition for status and prerogatives among ministries, is still struggling to assert its identity. It is trying to build up its presence within the sphere of government and the broader public consciousness. Unfortunately, without a presence in the regions, it cannot build up credibility for being a central actor in the coordination of the many environmental and climate change responses currently being implemented by government, donor-funded projects, and civil society organizations.

Some ask whether AEDD should second experts in climate change to regional bodies in the sectorial ministries, or whether AEDD should create regional offices (i.e., *Agence Régionale de Développement Durable*) with the mandate to publicize, manage, and evaluate recipients of Climate Funds at a more local level. This work would indeed fit the spirit of decentralization and devolution of services in Mali at this time. The proposed regional climate fund could be a mechanism to test this approach.

AEDD's mandate is rooted in knowledge management, public education, and coordination around responses to climate change. Unless the agency holds to this set of functions, it will face an inter-ministerial turf issue. The ARCC Mali Institutional Assessment team heard this refrain many times not only from the ministries, but also from civil society members on the governing board of AEDD. Several respondents noted, rightly or wrongly, that AEDD has grown too fast and impinges on the competencies of other institutions. With such prevalent complaints in mind, it is urgent that the *Ministère de l'Environnement et de l'Assainissement* clarify once again the mission of AEDD within the Government of Mali in order to avoid the turf issues that so easily lead to policy blockages and inter-ministerial tensions. These types of jurisdictional tensions are normal for any newly created agency. On a case-by-case basis, instances of competing or overlapping competencies must be resolved as soon as possible. One example that should be dealt with is the tension between AEDD and the National Directorate of Sanitation and Pollution and Wastes Control (DNACPN) over who should carry out strategic environmental impact studies. The lucrative work of carrying out environmental impact studies for large infrastructure projects generates much revenue for the concerned agency. In the end, AEDD must reassure ministries and other agencies that its mandate is anchored in the coordination and facilitation of environment and climate change issues.

AEDD is fortunate to have a centrally located and accessible headquarters surrounded by towering trees in downtown Bamako. The physical infrastructure is being rehabilitated at this time. The staff of AEDD consists of 45 members, of which 25 are senior personnel. Most staff are seconded from other ministries. Once staff time is handed over to AEDD, staff are under the full supervision of the agency. The AEDD senior management team has developed staff training plans to strengthen the technical



capacity of existing staff. The Director-General views the size of his staff as totally insufficient. He expresses an urgent need for 35 new staff, the majority of whom would be specialists needed to manage the Climate Fund, a carbon exchange, and policies and programs for launching a green economy. Plans are in place to recruit additional expertise, but this effort is contingent on additional funding. As AEDD increases its human resource base they should strive for gender equality across their hiring practices. For example, among the 45 staff of AEDD, there are only 11 women, of which six are executive assistants.

AEDD intends to expand the number of expert staff to serve the eight organizational principles and eight strategic axes of the *Politique Nationale sur les Changements Climatiques*. At this moment, AEDD is recruiting staff from the mainline ministries who primarily are field-oriented engineers in their particular domains. This recruitment strategy is consistent with a vision of providing technical expertise for each element of the PNCC. By staffing up so much with specific disciplinary expertise, AEDD may deviate from its core function of consciousness-raising about climate change realities, coordination, monitoring and evaluation, and communication of lessons learned. To ensure that their core functions are realized AEDD should recruit staff who have multidisciplinary skills to help conceive, coordinate, monitor, evaluate, and communicate around climate change programming.

The central issue AEDD confronts is how to cover the recurrent costs of staff and operations. AEDD has a very similar legal status to other agencies like Mali-Météo as a government-owned establishment of an administrative nature. It receives subsidies from the *Ministère de l'Environnement et l'Assainissement*, secondments of staff from other ministries as well as grants from multilateral and bilateral development organizations. At best, the subsidies from the Government of Mali will remain stable; however, in a time of severe budgetary constraints, cutbacks are highly possible. Certainly, budgetary costs will increase with the pressure to expand presence in the regions. If the Climate Fund unfolds as expected, AEDD will also face greater staffing costs. Thus, the question remains: how will AEDD assure a sustainable source of funding in the future?<sup>8</sup> How can AEDD raise funds without infringing on the prerogatives of other income-generating opportunities, like those of the DNACPN, who receive revenues from carrying out environmental impact evaluations?<sup>9</sup> Much debate in the hallways of the AEDD focuses on whether revenues from environmental taxation on environmental polluters could be in part allocated to AEDD to assure its long-term viability. These questions remain at the heart of the uncertainties surrounding the future of this new agency.

## 2.9 PROGRAMMATIC OPTIONS

The following options are spelled out for consideration to strengthen AEDD's ability to fulfill its mandate. These recommendations follow the five functional elements of the National Adaptive Capacity Framework, with the addition of the criteria of Institutional Sustainability – a missing element of the NAC, but one that USAID views as an essential design feature of any development program.

---

<sup>8</sup> AEDD could probably benefit from management fees from the Mali Climate Fund that the UNDP now receives (7 percent); but it would need to wait to for an additional five years until full management is handed over to the agency.

<sup>9</sup> AEDD believes it has the legal mandate to carry out strategic environmental impact assessments. The Government of Mali viewed this measure as a way to assure the financial viability of AEDD, but the environmental impact study and other taxes and charges on the environment are still channeled to the DNACPN.



### 2.9.1 Assessment

**Option #1: Support the Creation of an Information Charter.** The Government of Mali and international funding agencies should work with AEDD to develop an Information Data Management Charter that spells out how inter-sectorial information is to be collected, housed, and utilized by government and the general public. Unless relevant and reliable information on climate change dynamics is shared easily within government and outside, it will be very difficult for policy makers to design, implement, and evaluate programs that respond to climate change adaptation and mitigation. The various ministerial directorates need to come together to expand the use and sharing of databases (*SYFOR*, for example), with the possibility of alignment and networking between different data producers.

**Option #2: Update of Information on Climate Change.** The AEDD data management system will hopefully much improve with the World Bank's support of the framework of the Natural Resource Management Project in the Context of Climate Change (PGRNCC). This four-year project was at the early stages of starting in early January 2014. The first component of the project deals with the reinforcement of the National System of Integrated Management of Environmental Information (SNGIE). Within this framework, the project will update and complete the available information but will likely limit itself to its intervention area (Kayes and Koulikoro). Support could be provided to expand this pilot effort and improving data management. Recurrent costs are likely to remain considerable.

### 2.9.2 Prioritization

**Option #1: Strengthen the “Mainstreaming” of Climate Proofing into Mainline Ministries.** The German government will support AEDD's effort to integrate a climate change perspective into sectorial policies. AEDD hopes that this support will improve programmatic “climate-proofing” within the agriculture, water, and livestock production domains. Certainly, there is room for complementary support from other sources to expand climate mainstreaming into six more sectors like forestry, energy, transport, land-use planning, and habitat.

**Option #2: Expand Climate Proofing into the *Plan de Développement Economique, Social et Culturel* (PDESEC).** The enormous challenge confronting the Malian government is to integrate “climate-proofing” into the PDESEC. Support will be needed to work with the communes, *cercles*, and regions to help stakeholders at these scales determine how to build greater resiliency to the expected climatic conditions. Revising and updating the PDESEC to reflect new environmental and socioeconomic realities will be a never-ending challenge among the 703 present communes – a challenge in which AEDD can play a key role in formulation, review, and monitoring/evaluation for climate change proofing.

**Option #3: Scaling-Up AEDD in a Region.** The international development community needs to continue to coordinate the design and implementation of environmental programming carefully with AEDD and especially from the regional down to the commune level. International funding agencies can play a very useful role in helping AEDD gain presence in a particular region. This effort might take the form of supporting AEDD to set up appropriately staffed offices in the regions. Since climate change vulnerability is so high in the Mopti Region, as shown by the ARCC Climate Vulnerability Analysis, the Malian government and international funding agencies may find it programmatically opportune to focus in this region.

### 2.9.3 Coordination

**Option #1: Contribute to Climate Change Adaptation and Mitigation Intervention Mapping:** AEDD launched a research process in 2011 to map the interventions of government and donors in environmental interventions throughout the country. The process was halted due to the



political crisis in 2012-2013 but was taken up again. A concept note was prepared in November 2013 to structure the study. The AEDD itself is expected to complete the preliminary mapping exercise in March 2014. AEDD is expected to present findings to illustrate the need for complementary support in certain regions and to channel investment in certain underfunded sectors. AEDD will also need continued support from the donor community, as well as government services, to regularly update this mapping exercise.

**Option #2: Carry out Climate Vulnerability Assessments in Other Regions:** AEDD needs to gain a presence in the regions down to the commune level by helping these governance entities strengthen their resilience to drought and major weather events. At the regional level, the international donor community could support AEDD, with the assistance of strategic partners, to develop its own capacity to carry out regional assessments needed for preparing regional climate proofing exercises.

**Option #3: Support the Climate Change Fund or Invest in Regional Climate Change Proofing Interventions?** The international donor and private sector institutions face two options with respect to financing climate change adaptation and mitigation initiatives in Mali. The first, most supported by AEDD, is to contribute to the Climate Fund in Mali. Investing in this type of basket fund would greatly strengthen the mandate and authority of AEDD while also meeting the spirit of the Paris Declaration, USAID Forward, and other similar statements supporting national-level management of environmental and development funds. The second option is for the international donor community to continue business-as-usual to develop multilateral and bilateral projects to support various sectors in the national economy and, ideally, in specific regions. In this fashion, the donor maintains a greater level of fiduciary responsibility over the project.

- **Alternative I: Support to Climate Fund.** The central programmatic priority of AEDD is to operationalize the Climate Fund. If an international donor were to decide to complement the first contributor, Sweden, then this donor could occupy one of five places reserved for the Technical and Financial Partners of the Management Committee. According to the Director General of AEDD, the donor could place certain conditions on its contributions, such as requesting that the funds be channeled to reducing climate change vulnerabilities in a particular region. The contributor to the fund would lose a certain amount of autonomous decision making; on the other hand, it would be deeply integrated into the consultative process of determining fund priorities, disbursement mechanisms, and capacity building to rigorously administer the program. AEDD is prepared to enter into discussions with any potential contributor to this fund.
- **Alternative II: Support Regional Climate-Proofing Interventions.** At this point in time, the international donor and private sector community may view the Climate Fund as too risky to allocate funds to because of its newness. Instead, the bilateral and multilateral agencies and the private sector may find it preferable to design, implement, and monitor climate change adaptation and mitigation programs in accordance with its normal project design and implementation cycles. Through this option, the donor retains much more control over its funds but is nevertheless obliged to plan programs through mainline ministries, and to target its investments to regions of its own choice.

## 2.9.4 Information Management

**Option #1: Support for the Climate Fund communication plan.** AEDD has prepared a Communications and Outreach Plan. International sources of support combined with strategic assistance from the Government of Mali could support this communication plan, since terms of reference for specific outreach activities already have been prepared. The overall intention of the plan is to increase public awareness around climate change issues through the classic communications tools of radio,



television, forums, brochures, and websites. The AEDD communications plan also seeks to message out through more informal channels suited to the cultural milieu of the regions and *cercles*. This effort would include the use of music, traditional griot story tellers, and theatre. Reaching remote and disenfranchised rural populations, like those in the far north of the country, is essential.

**Option #2: Strengthen Capacity of the Information Center.** While the World Bank is expected to support the creation of a new documentation center, it will be important to monitor the viability of this information collection and retrieval center. If AEDD were to become more operational in the regions, the donor community could support regional-level documentation centers for the general public, equipped with internet and facilities for web-based review of documentation. These regional documentation centers linked to an AEDD presence could become a learning center for the regional press needing low-cost access to information stored in Bamako.

### 2.9.5 Institutional Sustainability

**Option #1: Contribute to the Preparation of a Business Plan.** AEDD faces enormous challenges to become financially sustainable. Like the Mali-Météo agency presented in the section below, AEDD is not yet financially autonomous. International funding sources could greatly contribute to the future of the agency by providing technical assistance to help AEDD develop a long-term marketing and business plan. This study could help determine how a combination of fees, taxes, subsidies, and sale of analytical services might generate sufficient revenue to cover the recurrent costs of office up-keep as well as personnel costs.

**Option #2: Reinforce AEDD Staff Technical Skills.** AEDD is a young agency with limited expertise in the many domains of climate change analysis and programming. Decision-making is concentrated within the executive and in Bamako. Decentralization and devolution of responsibilities within the agency are needed, but so is expansion into the regions. Malian government agencies and international sources of financing should be used to develop stronger partnerships between AEDD and international academic and research institutions to provide targeted short-term training to existing staff to address knowledge needs within the agency. For instance, academic and research institutes could help AEDD further develop the research and analytical programs around the four climate change “observatories” currently being set up throughout Mali. While the research itself should be carried out by academic institutions within Mali, AEDD can play an important role in helping to assure that analytical agendas fit into the broader national policy frameworks.



### 3.0 L'AGENCE NATIONALE DE LA METEOROLOGIE (MALI-METEO) INSTITUTIONAL ASSESSMENT

The *Agence Nationale de la Météorologie* (Mali-Météo) is a financially autonomous parastatal agency created in November 2012 out of the former Central Department of Meteorology of the Ministry of Equipment and Transport. With this new legal status, Mali-Météo is required and empowered to raise its own financial resources from both the public and private sectors. The young agency confronts numerous challenges to meet its mandate of providing reliable and timely weather-water-climate information and analysis to a wide range of public and private information users.

The ARCC Institutional Assessment of Mali-Météo finds that the agency provides a range of services to the general public – particularly to the agricultural sector and to the civil aviation world through the continuing contractual relationship with ASECNA and ANAC. The Mali-Météo institutional structures provide information and analysis on a fee-for-service basis. The agency has identified some new markets for services as well as clients willing to pay for weather information and analysis. However, with the looming threat of retirement of the majority of its experienced technical staff within the next seven years, the agency may soon lack the internal capacity to provide information and analysis to a public demanding and willing to pay for increasingly sophisticated weather and climate services.

Mali-Météo is at a crossroads. Unless it develops a long-term business strategy and action plan for capturing and effectively meeting the demand for its services from public and private sector clients, the agency will not be sustainable. Even though the Government of Mali cannot cover the entire recurrent and capital improvement costs of this strategic public services agency, it remains very supportive of the mandate of Mali-Météo. The international development community cannot be expected to cover recurrent costs of operations and maintenance. Only by developing and effectively implementing a cost-recovery plan can Mali-Météo survive into the 21st century as a viable advisory service provider of integrated weather-water-climate data and analysis.

**FIGURE 4. NEW MALI-MÉTÉO HEADQUARTERS NEAR THE BAMAKO-SENOU AIRPORT**



*Source: Mohammed Boulahya*



The international development community can play a timely role at this juncture to help Mali-Météo increase its capacity to become a strong and independent technical advisory service providing integrated weather data and climate information to a wide spectrum of audiences. Strategic assistance to rebuild and modernize existing weather stations is urgently needed. Some international sources of support are prepared to provide this strategic investment. For instance, through CILSS the World Bank *Projet de Résilience face aux Catastrophes dans le Sahel* plans to support the rehabilitation of the Mali-Météo and the Burkina Faso meteorological services as well as strengthen the capacities of regional institutions like ACMAD, NBA, AGRHYMET, and OSS to provide information and analysis on climate change adaptation and mitigation issues.

At the time of preparation of this assessment, negotiations with the World Bank were still unfolding. Similarly, through the Spanish government supported AFRIMET Climate Services Fund, some much-needed technical support is available to West African meteorological institutions for capacity building and global observation systems.

While Mali-Météo is likely to receive much-needed inputs of capital and technical capacity building, the currently ongoing or planned projects are not equipped to assist Mali-Météo to develop strategic and long-term strategies and plans for mobilizing financial resources originating from within the Malian private and public sector. Targeted and short-term technical assistance can be provided to meet this key need. Similarly, to our knowledge, no funds have been set aside for protection, scanning, and public dissemination of the valuable national weather archives reaching back to 1895. Much-needed bridge funding could be used to identify the costs of saving these documents of inestimable value to the meteorological world and help to put in place long-term funding required to protect these documents and make them public for research and analytical purposes. Finally, Mali-Météo is in urgent need of a reliable telecommunication link with the Bamako-Airport Aviation Weather Centre (still operated by ASECNA with 19 Synoptic Stations) in order to make timely use of all the Weather Watch Networks for public services like flash flood forecasting as well as to widely disseminate its Agro-Meteorological Observations and Weather Radar Observations of importance to aviation operations and security.

**FIGURE 5. ARCC MALI-MÉTÉO ASSESSMENT**



**Meteorologist Mohammed Boulahya, Mali-Météo Director General M'Pié Diarra, and Team Coordinator Mark Freudenberger.**

*Source: Mohammed Boulahya*



### 3.1 HISTORY OF MALIAN METEOROLOGICAL SERVICES

From the colonial period to 1979, the meteorological services in Mali primarily focused on providing information to the aviation industry. As far back as 1959, Mali was a member of ASECNA, the *Agence pour la Sécurité de la Navigation Aérienne en Afrique et à Madagascar*. In 1979, the meteorological services department was elevated to the status of a National Directorate of Meteorology (DMN). This new role opened up the door for the department to provide weather data not only to the aviation industry but also to the agricultural sector, which was increasingly affected by the severe droughts of the early 1980s. The national weather service built up its reputation and capacity under the *Direction Nationale de la Météorologie* of the Ministry of Equipment and Transport. Mali-Météo continues to serve a most demanding user — the ASECNA — through well-organized provision of meteorological data to the aviation industry. The synoptic weather station at the Bamako airport is staffed by highly qualified and certified professionals under the joint control of the World Meteorological Organization and the International Civil Aviation Organization (ICAO). These very high international standards are the technical reference point for generating data needed for analysis of climate change and weather variability.

By 1992, the National Directorate of Meteorology was separated from the aviation-oriented weather services of ASECNA. Today, the break between ASECNA and Mali-Météo is abundantly clear. Each is an autonomous entity with separate weather stations, communication systems, and staffing. ASECNA continues to manage the 16 functional Synoptic Stations, three inter-regional Synoptic Stations; three Upper Air Stations (airports at Bamako-Senou, Mopti, and Gao); and the Weather Watch Center at the Bamako-Senou airport. Despite their common origins, Mali-Météo does not have easy access to the wealth of weather data ASECNA produces. Not even an electronic communication link exists between the sophisticated ASECNA weather stations at the Bamako-Senou airport and the nearby headquarters of Mali-Météo. Mali-Météo must wait at least six hours to receive weather alerts from international agencies rather than up-to-the-minute data so important for flash-flood alerts during the rainy season. This bifurcation of services between the aviation industry needs and those of the broader public continued through the 2005 creation of a new institution, the *Agence Nationale de l'Aviation Civile* (ANAC) — a semi-autonomous parastatal providing, among other aviation services, weather information to civil aviation within Mali. The separation of weather services between the aviation sector and the general public was further widened by the decision in July 2008 whereby member states mandated the ASECNA to sub-contract Mali-Météo only for data that the international aviation industry needed. Contractual stipulations clearly indicate that

#### MALI-MÉTÉO MANDATE

The mandate for Mali-Météo described in the law creating the agency notes: “Within the context of climate change impacts and challenges, this central structure in charge of national meteorological services is increasingly solicited to respond to multiple needs of different economic sectors, both public and private. The transformation of the National Direction of Meteorology into a National Agency of Meteorology granted with the status of a public entity responds to the following items:

- Continue the mode of autonomous management of the aeronautical industry and national meteorological services
- Assure an improved management of meteorological and climate services in the socioeconomic environment of the moment
- Permits Mali to progressively take over all national meteorological activities.

(Law no. 049/2012 creating Mali-Météo and Council of Ministers Reports [2011-2012])



ASECNA is to refrain from subsidizing national weather services like Mali-Météo. Indeed, at some future time the current synoptic weather stations managed by ASECNA are to be transferred to Mali-Météo.

Mali-Météo came to the forefront of African weather services through nearly 30 years of Swiss government support for the Agro-Meteorological Advisory Program, which was designed to provide weather information and technical assistance to farmers and pastoralists to improve agricultural and livestock productivity. This program was one of the first to enable Mali-Météo to provide weather services to rural populations. The innovative interministerial working group of mainline ministries, called *Groupe de Travail Pluridisciplinaire d'Assistance Agro météorologique (GTPA)*,<sup>10</sup> was set up to conceive, integrate, and communicate meteorological and agriculture advisory services to villagers supported with simple rain gauges and by locally organized groups called *Groupe Local d'Assistance Météorologique au Monde Rural (GLAM – see listing of present members below)*. This national working group, GTPA, continues to function; every 10 days during the May-October rainy season it produces a bulletin of weather information and technical recommendations for the agricultural sector. A multidisciplinary government working group concluded that this weather and agronomic outreach increases agricultural yields by at least 25-30 percent (GTPA, 2013:3). No rigorous evaluations had tested these premises until the impact evaluation launched by USAID with the University of South Carolina and professor Ed Carr.<sup>11</sup> The final version of this impact evaluation report was pending at the time of this assessment; full results were not yet available.

### 3.2 MANDATE OF MALI-MÉTÉO

In November, 2012 Mali-Météo was established as a semi-autonomous public institution under the auspices of the Ministry of Equipment and Transport with financial management autonomy.<sup>12</sup> The adjoining text box summarizes the mandate of the agency. Building on the 1992 global mandate of the World Meteorological Organization (WMO) to provide weather and climate information to a broader range of public and private users, Mali-Météo is now an agency struggling to generate the financial resources to not only cover recurrent costs, but to generate the capital needed to modernize existing facilities and rebuild weather stations damaged by the civil disturbances of 2012/2013. In effect, Mali-Météo faces the same challenges as a private firm seeking to generate sufficient new business to survive and expand in a highly competitive world.

#### MALI-MÉTÉO VISION STATEMENT (2012)

Transform the *Agence Nationale de la Météorologie* into a modern service capable of satisfying in real time and throughout the country the needs of utilizers (policy makers, public-at-large, operators in specific socio-economic sectors) with viable and adapted meteorological information in order to significantly increase the agency's contribution to the social and economic development of the country.

<sup>10</sup> Decision no. 11-0338/MET-SG by the Secrétaire Général of the Ministère de l'Équipement et des Transports of October 4, 2011 formally authorized the creation of the GTPA at the national level and the GLAM at the regional level.

<sup>11</sup> The initial baseline study has been presented by Carr (2013).

<sup>12</sup> The law no. 049 creating Mali-Météo on November 23, 2012 notes that the new agency has the legal status of a “*un établissement public à caractère administrative*.” The decree notes that this new legal status has the advantage of continuing the financially independent status of the national aeronautic services, meets the unique social and economic situation in Mali, and opens the door for Mali to take over all the climate services and eventually all meteorological services now in the hands of external actors (i.e., ASECNA).



Mali-Météo's mandate considerably expanded in 1992 when the agency became the initial focal point for the UNFCCC from 1992 to 2011. This function has now been transferred to AEDD. As with many meteorological services in Africa, Mali-Météo is the permanent representative of Mali to the WMO, the IPCC, and regional organizations like AGRHYMET and ACMAD. Mali-Météo also maintains strong working relations with international institutes like the International Research Institute for Climate and Society (IRI) at Colombia University.

### 3.2.1 Governance

Mali-Météo operates under the guidance of the multi-stakeholder governing board called the *Conseil d'Administration*. The decree no. 569 of July 8, 2013 stipulates that the board consist of a total of eight members from sectorial ministries (Environment, Agriculture, Water, Scientific Research, and Civil Defense) and two representatives of users such as the union of professional farmers. The Minister of Equipment and Transport is the president. The governing structure greatly facilitates transparency and coordination during this new age when Mali-Météo is no longer under the thumb of the aviation sector. However, with the obligation to raise its own revenues, the public and private sectors so long accustomed to free meteorological services are resisting payment-for-services that Mali-Météo demands. Leading up to the founding of Mali-Météo, the dynamic and very highly qualified director of the National Directorate of Meteorology, Mama Konaté (*Chevalier de l'Ordre du Merite*), created the vision for this new agency while building many institutional affiliations around the world and especially within the WMO and UNFCCC.

The first meeting of the Mali-Météo Governing Board was convened on August 15, 2013 with the purpose of approving the organizational structure of the agency and the budget rubrics. The administrative and accounting procedures were rapidly set up with the accounting structure subject to independent external audits. Staff were absorbed from the National Directorate of Meteorology.

Mali-Météo actively participates in various inter-ministerial forums and maintains many relations with mainline ministries. Especially close relations exist with the Ministry of Agriculture and the National Civil Defense agency. Mali-Météo collaborates closely with AEDD, even though there were some hard feelings when AEDD took over the representational functions in the UNFCCC as National Focal Point. Climate change coordination for adaptation and mitigation is now in the hands of AEDD, but Mali-Météo actively participates in national forums when AEDD invites them. For instance, Mali-Météo actively contributed to the inter-sectorial expert teams preparing documents for climate change preparedness that the UNFCCC and Global Environment Fund (GEF) requested. The agency invested considerable time in preparing a chapter and project proposal dealing with the use of agro-climatic technologies for adaptation and risk management in the agricultural sector. The transaction costs for Mali-Météo participation in inter-agency discussions are particularly high at a time when cost recovery options to pay for staff participation in these coordination meetings are limited. Current government budgetary allocations for personnel indeed cover labor costs for inter-ministerial work, but it could be argued that these funds could be better spent by a limited pool of personnel for developing new business opportunities or rehabilitating damaged or destroyed weather stations.

### 3.2.2 Cost Recovery

The independent management and legal status of Mali-Météo allows it to charge for meteorological services. With this mandate to generate and retain funds from the sale of services in addition to the receipt of external funding, the agency is in an excellent position (unlike government departments) to establish and carry out contracts. Decree no. 569 from July 8, 2013 presents the modalities for payment of fees and meteorological services. Various exemptions and reductions in fees can be authorized by



separate administrative circulars by the Ministry of Transport and Equipment and the Ministry of Finance. Government agencies and ministries indeed request weather data; though some, like AEDD, are surprised by the very high cost of preferred information. Ministries are neither prepared nor able to pay for meteorological data because few understand that Mali-Météo's status as an independent agency necessitates the sale of data to recoup costs; however, the private sector, like engineering firms, does pay for weather data needed for designing infrastructure such as dams, irrigation systems, and roads.

### 3.2.3 Operational Budgets

The Mali-Météo annual operating budget is \$6.5 million. A special investment fund is set aside each year; 86 percent of this budget covers the cost of the popular and politically expedient Precipitation Enhancement Program (PEP – cloud seeding intervention and associated costs of seasonal radar operations). Relatively little funding goes into the recurrent costs of existing weather stations and the reconstruction of the 13 damaged by the recent civil disturbances in the North of the country. See adjoining text box for the 2013 budget breakdown.

#### 2013 BUDGET BREAKDOWN

1. **Operational Budget:** 869,804,448 CFA (\$1,841,816). 11 percent allocated for purchase of services; 89 percent for personnel and rehabilitation of non-synoptic weather stations.
2. **Special Investment Budget:** 2,263,917,167 CFA (\$4,793,112) 86 percent for cloud seeding; remainder for other special budgetary needs.

**Total:** 3,133,721,615 CFA (\$6,634,500)

**Exchange Rate:** \$1 = 472 CFA

**FIGURE 6. MALI-MÉTÉO RADAR STATION AT MANANTALI**



**Mali-Météo radar station at Manantali used for rainy season weather forecasting and cloud seeding.**

*Source: Mali-Météo, 2014*

As represented by the network of weather stations, severe resource constraints threaten the infrastructural foundation of Mali-Météo. Weather stations were severely damaged in the northern parts



of the country during the disturbances of 2012/2013. This fact alone is not the only issue affecting the performance of the agency. Equally important, the short-wave Single Side Band (SSB, BLU) radio network is not functional, so time-sensitive data collected at various weather stations are not rapidly communicated to the headquarters. Vehicles needed to visit weather stations and provide services to local users of Mali-Météo, like the GLAM, are in a sorry state compounded even further by insufficient funding for recurrent costs for fuel and parts.

### 3.3 SERVICES

Mali-Météo is a well-respected and renowned institution in Mali. It has a long and illustrious history reaching far back into the colonial period for the collection, storage, and dissemination of weather information. Like meteorological services throughout the world, it houses a wide variety of information in different forms ranging from fragile archives reaching back to 1895 to electronic data stored on hard drives within the agency. Citizen demand for accurate weather information appears very high, and a wide sector of the urban and rural public trusts Mali-Météo national weather forecasts. Anecdotal reports indicate that farmers from surrounding countries who are able to receive national weather reports take great stock in the specialized information and advice Mali-Météo provides. The agency also continues to provide much climatic data to scientists preparing regional- and country-level climate change assessments. It also has played a role in responding to climate risk reduction through participation in various institutional forums and by providing meteorological services. The cloud seeding program appears to be popular and is fully supported by the government.

**FIGURE 7. SYNOPTIC STATION AT BAMAKO-SENOU AIRPORT**



*Source: Mohammed Boulahya*

Below we describe these Mali-Météo achievements in greater detail, organized under the following seven headings:

- Collecting observational data: maintaining and collecting data from radar stations, synoptic stations, agro-climatic stations, auxiliary agro-climatic stations, and observation posts (214 posts). Only rainfall is recorded;
- Receiving data from other institutions: satellite data and weather numerical information from other meteorological centers;
- Meteorological services: providing weather data and forecasting, agro-climatic analysis, and weather alerts;
- Running the agro-meteorological advisory program, which provides information to rural users;
- Providing data for climate change modeling and for conducting analysis;
- Conducting the Precipitation Enhancement Program, which seeds clouds to induce rain; and
- Additional specialized services.



### 3.3.1 Collecting Observational Data

Mali-Météo and its distinguished predecessors have collected weather data in Mali since 1895. The earliest weather stations in West Africa in Niouro-du-Sahel and Kayes were set up to record basic weather data (rainfall, temperature, wind, etc.). The early historical records remain to this day and are housed in the archives of Mali-Météo but have greatly suffered from three successive moves (ASECNA, ANAC, DMN) and most recently to the Mali-Météo Agency. Over time, the range of collected weather data has expanded considerably. Today, a network of radar stations, internationally regulated synoptic stations, and agro-climatic stations are strategically situated throughout the country. As in many countries, volunteers from the general public provide supplemental rainfall and temperature data. Weather information is increasingly housed within electronic databases operated by Mali-Météo, ASECNA, and various international bodies as mandated by the World Meteorological Organization.

The Mali-Météo network of weather stations consists of the following hierarchy and status summarized briefly below and described more fully in Table 1.

- **Radar Stations:** There are four radars at the airports of Bamako-Senou, Mopti, and Gao, as well as at the Manantali dam in western Mali (see Figure 3). Unfortunately, the radar at Gao was completely destroyed in 2012. Information collected at these stations is fed into the international and national aviation data collection systems described in more detail below. These radars observe cloud formations in a radius of about 250 – 300 km; when functional they are very useful for observing rainfall in areas of very difficult access.
- **Synoptic Stations:**<sup>13</sup> ASECNA manages the 19 stations at this time, but over time these will be incorporated into the Mali-Météo weather station network. Nine meteorologists and 62 weather observers and support staff observe, transmit, and analyze weather data. Three stations were destroyed during the crisis of 2012/2013. Data are transmitted into the national and international weather network following strict WMO protocols and are especially useful for national and international weather forecasting and weather reports. Weather data is observed and recorded eight times per day at each station, transmitted by BLU radio to the ASECNA headquarters, and entered into databases. The monthly summary is shown in Figure 11. See Figure 12 for the present location of these stations in Mali.

**FIGURE 8. MALI-MÉTÉO SYNOPTIC STATION AT GAO BEFORE ITS DESTRUCTION DURING THE CIVIL DISTURBANCES OF 2012/2013**



Source: Mali-Météo, 2014

---

<sup>13</sup> A synoptic weather station houses instruments that collect meteorological information at synoptic time (00h00, 06h00, 12h00, 18h00 UTC) and at intermediate synoptic hours (03h00, 09h00, 15h00, 21h00 UTC). These stations often consist of instruments like an anemometer, wind vane, pressure sensor, air temperature, humidity, and rain-gauge. The weather measures are presented in an internationally accepted format and transmitted to the WMO to help prepare weather forecast models. These stations must be constructed to withstand the most severe weather conditions.



- **Principle Agro-Climatic Stations:** There are 19 stations, but some have been damaged or abandoned due to the recent conflicts. Measurements are supposed to be taken three times per day of agro-meteorological parameters like rainfall, wind, temperature, and solar intensity. Frequency is sometimes less if there are staff absences. These stations no longer have communication systems to transmit data throughout the day to the Mali-Météo headquarters in Bamako. See Figure 13 for the present location of these stations, damaged or not.
- **Auxiliary Agro-Climatic Stations:** There are 35 stations. Only rainfall and basic weather information is collected at these stations.
- **Observation Posts:** There are 214 posts. Only rainfall is recorded. Mali-Météo pays a small remuneration when data is submitted by volunteers (e.g., school teachers, interested citizens), usually totaling about 15,000 CFA/year (about \$30/year). This information is often transmitted nationally and internationally (Radio France Internationale) and is apparently followed with great interest by the Malian diaspora in Europe, who use this information when calculating how much remittance to send family members in rural areas to cover food deficits. Rainfall information helps them estimate whether expressed needs are indeed true. See Figure 15 in the following pages for the approximate locations of these observation posts.

### 3.3.2 Receiving and Managing Data from Other Institutions

Mali-Météo receives meteorological data through a satellite reception station at the Bamako-Sénou airport and the central office of Mali-Météo. Satellite data of 1-3 km resolution is received in 12 visible channels and infrared.<sup>14</sup> It also receives the numerical weather previsions and model outputs from the regional and international meteorological centers that the WMO, ACMAD, AGRHYMET, ECMWF, IRI, and National Centre for Environmental Prediction of the National Oceanic and Atmospheric Administration (NCEP-NOAA) coordinate.

### 3.3.3 Meteorological Services

Mali-Météo continues to place programmatic importance on providing meteorological services to the aviation industry and provides effective service for this client, which demands timely delivery of weather data while contributing to the cost of agency operations. ASECNA will no longer subsidize Mali-Météo as in the past because of new internal efficiency criteria.

**FIGURE 9. AGRO-CLIMATIC STATION AT SOTUBA**



**Agro-climatic Station at Sotuba.** These stations need more up-to-date measurement tools like digital weather stations connected to the cell phone network.

*Source: Mohammed Boulahya*

<sup>14</sup> The Meteosat satellite is spin-stabilized and capable of greatly enhanced Earth observations. The satellite's 12-channel imager, formally known as the spinning enhanced visible and infrared imager (SEVIRI), observes the full disk of the Earth with a repeat cycle of 15 minutes in 12 spectral wavelength regions or channels.



Mali-Météo also heavily invests in meeting demands for weather information from the general public and for specific agro-meteorological services for smallholder agriculture communities.

It sells raw and analyzed data at rates established by the decree no. 94-470 and the inter-ministerial rule no. 0210/MICT-MEF-SG. Currently, 60 percent of the demand for this information comes from students and researchers, who receive it for free. The other 40 percent of requests come from paying clients in the public and private sectors (agriculture, energy, public works and engineering, insurance companies, national civil defense, and commerce).

During the ARCC Mali Institutional Assessment of Mali-Météo and AEDD, the ARCC project also carried out a survey of development organizations in Bamako and carried out focus groups with rural communities. In conjunction with the present study, questions on the utility and willingness to pay for Mali-Météo products and advisory services were inserted into the questionnaires administered to organizations and village focus group participants. Interviewed organizations included domestic and international nongovernmental organizations; bilateral donors; multilateral donors; donor-funded programs; government extension programs; and farmer associations. Focus group discussions were held in diverse agro-ecological areas in Mali to determine the agricultural practices that have evolved during the past 20-30 years in response to climate change and to identify newer practices that currently are being introduced, promoted, and adopted.

The survey indicated that all but one of the 35 interviewed organizations think weather information that Mali-Météo provides is of medium to high importance. Interviewees cited various reasons, but most noted that weather information provided through radio and television helps farmers decide when to plant rainy season field crops in an increasingly erratic climate. Pastoralists also benefit from weather information by knowing where it rained so that they can search out water points and good pastures. One organization provides rain gauges to farmers, while another noted it actively participated in Mali-Météo trainings. Respondents suggested that Mali-Météo diversify meteorological services provided to the public and highlighted the opportunity of innovative uses of cell phones. All national NGOs were willing to participate in some type of cost-recovery mechanism for Mali-Météo services. International organizations were more reticent, saying that they believed it was the role of the state to provide free meteorological information to all users.

The focus group discussions held in 14 villages primarily focused on agricultural practices and innovations. Toward the end of each meeting, discussion turned to the utility of Mali-Météo weather services. All focus groups indicated that weather information provided through television and radio was extremely important for them during the rainy season to assist decision-making around dates of planting, weeding, fertilizer application, and harvesting. Respondents indicated that they pay attention to advice on the radio and television suggesting dates for planting. In villages with rain gauges, participants noted that these instruments help them more accurately determine when to plant field crops and use fertilizers. In those cases, some indicated the utility of keeping rainfall records for comparison between years.

**FIGURE 10. MALI-MÉTÉO ARCHIVES**



**Valuable weather archives are stored in the basement of Mali-Météo, like these from 1946. Many station data sets are already organized.**

*Source: Mohammed Boulahya*



# FIGURE II. SYNOPTIC STATION MONTHLY DATA SUMMARY



**ASECNA**  
**SERVICE DE L'EXPLOITATION**  
**MÉTÉOROLOGIQUE**

## TABLEAU CLIMATOLOGIQUE MENSUEL

(8 observations par jour)

ANNÉE : 2013

MOIS : JUILLET

LATITUDE : 12°32'N

LONGITUDE : 07°57'W

ALTITUDE : 380m

Heures d'ouverture de la station : 0000 à 2400

CHEF DE STATION RESPONSABLE : KANTE BAKARY

STATION : BAMAKO-SENOU

ETAT : MALI

Altitude de la cuvette du baromètre : 365.52m Cor. Inst<sup>ale</sup> : -0,12Hpa Cor. Gravité : /  
Hauteur de l'anémomètre au dessus du sol : 11,05m  
Type de l'anémomètre : DEOLIA 92  
Nombre de contact du transmetteur de la girouette : 36  
Nature du pluviomètre enregistreur : A AUGETS BASC. Cylindre : QUOTIDIEN  
Nature de l'héliographe : CAMPBELL.  
Nature de l'évaporomètre : Piche Droit / Bac Classe "A"  
Nature de l'actinomètre : Néant

Renseignement sur les  
changements d'installation  
et d'équipement de la station

BAROGRAPHE HORS SERVICE  
STATIONS VENT EN PANNE LE  
19/07/2013

Axe du fuseau horaire de la région à laquelle la station est rattachée : 0<sup>cmc</sup>

LORSQU'IL EST MIDI, HEURE DU RESEAU, IL EST } 1200 heures en T.U (méridien international).  
1200 heures légales.

## RESUME CLIMATOLOGIQUE DU MOIS

Température (en degrés Celsius et dixième):

Moyenne mensuelle des minimums Tn : 21,8

Moyenne mensuelle des maximums Tx : 32,1

Moyenne (Tn+Tx)/2: 27,0

Minimum absolu : 19,0 le 20

Maximum absolu : 34,7 le 27

Moyenne quotidienne la plus basse : 24,5 le 21

Moyenne quotidienne la plus élevée : 28,5 le 17

Précipitations :

Hauteur d'eau recueillie en mm : 153

Durées totales en heures et dixièmes : 28

Hauteur maximale en 24 heures : 36 le 07

Intensité remarquable :

Evaporation : hauteur totale en mm : PICHE : 77 BAC 181

Insolation : durée totale en heures : 230

Vitesse maximale instantanée du vent : #REF! ##

Nombre de fois que pour 248 observations la vitesse du vent a été, selon les directions, égale ou supérieur à 1 m/s

Dr	02	04	06	08	10	12	14	16	18	20	22	24	26	28	30	32	34	36	Total
21																			
20																			
19																			
18																			
17					1														1
16					1														1
15					1														1
14					1														1
13					1														1
12					1														1
11					1														1
10					1														1
9					1														1
8					1														1
7			1	1												1	1		4
6	1	1	1	1			1	1	1	2	2					1	2		14
5	1	2	1	1	1	1	1	1	2	3	5	2				1	2		24
4	1	2	2	1	1	1	1	2	8	5	12	5	4	4	1	4	1	1	55
3	1	1	3	3	2	1	2	5	12	14	23	10	8	11	1	4	1	1	103
2	1	2	3	3	6	1	7	9	19	29	45	15	16	13	1	5	2	4	181
1	1	3	3	5	8	1	10	12	21	31	55	20	17	18	2	5	4	5	221
Nombre de vents < 1m/s : 27										Nombre de vents < 2m/s : 67									

Nombre de jours où les phénomènes suivants ont été observés

Précipitations			Chute de grêle		Orage ou tonnerre		Eclair sans tonnerre		Brouillard		Brume humide		Brume de sable		Chasse sable	
mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm
≥0,1	≥1,0	≥10,0	≥0,1	≥1,0	≥10,0	≥0,1	≥1,0	≥10,0	≥0,1	≥1,0	≥10,0	≥0,1	≥1,0	≥10,0	≥0,1	≥1,0
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
17	13	5	0	21	6	0	1	0	2							
Insolation			Tn		Tx		Tm		Tn		Tx		Tm		Tn	
mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm
≥0,1	≥1,0	≥10,0	≥0,1	≥1,0	≥10,0	≥0,1	≥1,0	≥10,0	≥0,1	≥1,0	≥10,0	≥0,1	≥1,0	≥10,0	≥0,1	≥1,0
11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
0	7	0	0	/	#REF!	0	4	27	0	0	5	26	0	0		

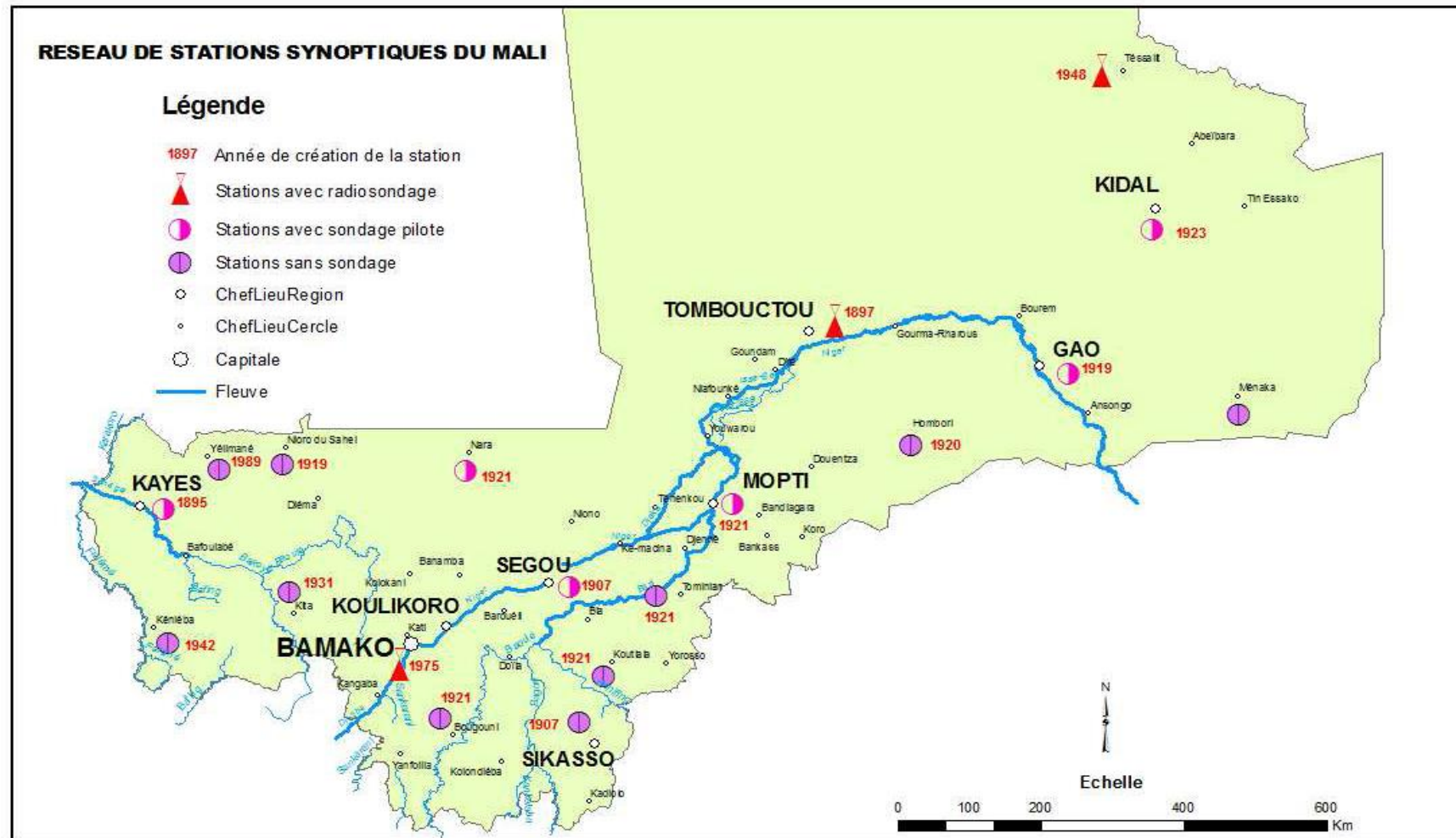
**CARACTERES DOMINANTS DU MOIS :** Le mois est caractérisé par un vent dominant du SW et par les écarts par rapport à la moyenne des 10 dernières années relatifs aux paramètres suivants : Température minimale : + 0,1 Température maximale : + 0,6

Pluviométrie : -74,9 Nombre de jour : -1

Beaucoup de formations d'orages accompagnés de peu de pluie. Pluviométrie très déficitaire par rapport à la normale et à la moyenne des



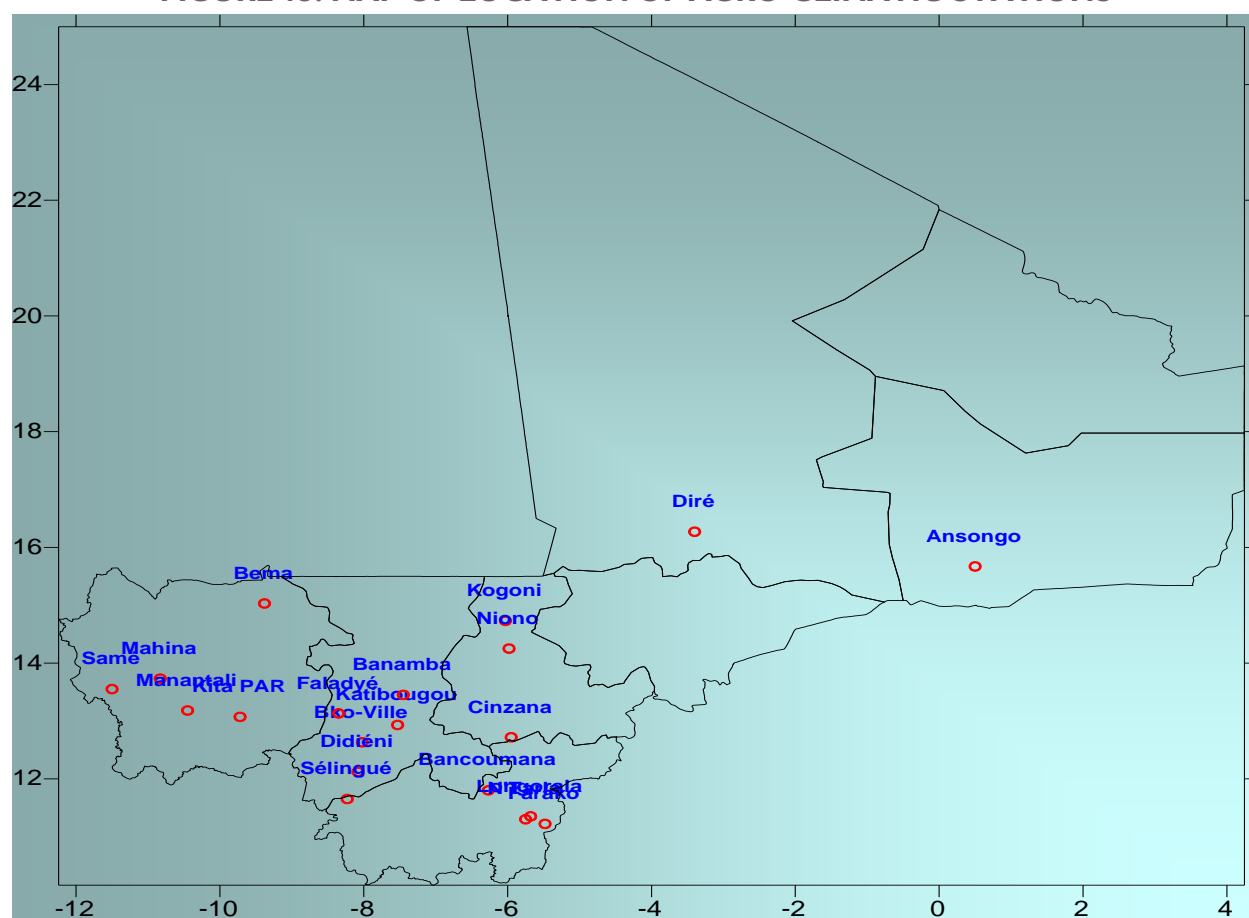
FIGURE 12. MAP OF LOCATION OF SYNOPTIC STATIONS



Source: Mali-Météo, 2014



**FIGURE 13. MAP OF LOCATION OF AGRO-CLIMATIC STATIONS**



Source : Mali-Météo, 2014



**TABLE I. FUNCTIONS AND STATUS OF MALI-MÉTÉO WEATHER COLLECTION NETWORK<sup>15</sup>**

Weather Station Type and Status	Collected Weather Data	Transmission of Data to Headquarters	Database for Analysis and Storage	Uses of Information
<p><b>Weather-Satellite Ground Receiving Station:</b></p> <p>a) First station at Bamako-Sénou airport for aviation weather services (ASECNA) and</p> <p>b) Second station at the central forecasting office of Mali-Météo (new in 2013) for Public Weather Services</p>	<p>European Meteorological satellite (Meteosat Second Generation [MSG] position 0-0) is very well located for Europe, the Atlantic, and Africa.</p> <p>The data are up to 1-3 km resolution in 12 channels (visible+ infrared Spectrum).</p> <p>Receives numerical weather analysis, prediction, and Global Model Outputs from International Meteorological Centers (e.g., WMO, ACMAD, AGRHYMET, ECMWF, IRI, and NCEP-NOAA).</p>	<p>All information is simultaneously, directly received at the Mali-Météo National Centre (with antenna installed on the roof of the main building) and at the airport.</p> <p>Information is then integrated in other databases like the Weather Radar Network and the National Meteorological Observing Systems.</p> <p>The two ground stations work as a backup to each other, but presently with manual transmissions between the Airport and Mali-Météo Centre. Some staff walk with data on a flash disk from the airport to Mali-Météo.</p>	<p>Information is stored within the receiving station computer facilities for a few days.</p> <p>Data storage capacity needs to be expanded to support specific studies of severe weather events like the Bamako flash flood on August 28, 2013, or the evaluation of each rainy season.</p>	<p>Weather forecasters on duty at Mali-Météo use this weather information from Mali, the Sahel, Africa, and the entire Globe to provide a national weather watch and Public Weather Services for civil defense and agriculture operations.</p> <p>There is a strong need for a telecommunications link between the Airport Weather Forecasting Centre and the National Centre at Mali-Météo. Presently, the exchange of information is done by the on-duty meteorologist visiting the ASECNA center one hour per day and in special circumstances.</p>

<sup>15</sup> Summary table compiled by the authors of this report from data presented by Mali-Météo, interviews, and personal observations.



Weather Station Type and Status	Collected Weather Data	Transmission of Data to Headquarters	Database for Analysis and Storage	Uses of Information
<b>Radar Station:</b>  There are radars at Manantali (for the Water Reservoir) and the airports of Bamako-Senou, Mopti, and Gao. The radar station at Gao was completely destroyed in 2012.	Data is collected on cloud formations and rainfall in a radius of 250-300 km.	The radar network is interconnected through a dedicated system operating three months per year during the rainy season.  They need two more weather radar to complete coverage of the country.	A data server positioned at Mali-Météo integrates cloud information coming from each site using the Internet.  If the Radar Net is operated at least for six months, this Rain Watch/Evaluation could help the agricultural sector and the public at large.	On request, the cloud seeding team primarily uses this information for their operations and interventions.  The Aviation Security at Bamako and other airports could greatly benefit from this radar information when a live telecommunications link is established with ASECNA.
<b>Synoptic Stations:</b>  On behalf of Mali-Météo, ASECNA operates 19 stations for a transition period from 2013 to 2014. Six stations were destroyed during the 2012 events.	Data is collected on rainfall, temperature, humidity, wind speed and direction, sunshine duration, evaporation, ground temperature, cloud cover, and special phenomena such as sand haze and sand storms.  Certified professional meteorologists operate the station 24/7.	Data is communicated through the SSB (BLU) Radio and dedicated phones within the ASECNA Telecommunication Network to the ASECNA-Mali main communication center at Bamako Airport.  There is an urgent need for an online communication link with Mali-Météo National Centre.	The live database is communicated internationally through the WMO-Global Telecomms System and temporarily stored at the ASECNA Weather Centre.  The climate data is manually retrieved by Mali-Météo staff for control, archiving, and various climate analysis services.	Uses range from private aviation to national public weather forecasting and weather reports with daily, 10-day, and seasonal regularity. National weather forecasting is compromised by a lack of 24/7 access to ASECNA data. Presently, staff hand-carry data daily from ASECNA to Mali-Météo.
<b>Principle Agro-Climatic Stations:</b>  There are 19 stations, but seven are not functional because they were destroyed during the 2012 events.	Data is collected on rainfall, temperature, humidity, wind run, sunshine duration, evaporation, and ground temperature.  They are operated with three main daily observations by certified professional meteorologists.	Data is communicated by the SSB (BLU) Radio and cell phones to Mali-Météo through ASECNA. But there are many SSB (BLU) Radios, and the meteorological equipment is obsolete.	Data is stored at Mali-Météo and integrated on a monthly basis with the Digitized Climate Data Base.	This information contributes to climate services for rural people through the GTPA and to other private and public services for agriculture, health, industry, transport, and civil defense.



Weather Station Type and Status	Collected Weather Data	Transmission of Data to Headquarters	Database for Analysis and Storage	Uses of Information
<b>Auxiliary Agro-Climatic Stations:</b>  There are 35 stations, but after the 2012 events and financial difficulties, they have been restricted to rainfall measurements.	Data is collected on rainfall, and previously on temperature and humidity.	Data is communicated through regular cell phones with financial contribution from Mali-Météo or collaborating institutions in the agriculture and other sectors.	Data is stored at Mali-Météo and integrated on a monthly basis with the Digitized Climate Data Base.	This information contributes to climate services for rural people through the GTPA and to other private and public services for agriculture, health, industry, transport, and civil defense.
<b>Observation Posts:</b>  There are 214 volunteer observers and dedicated farmers collecting information with rain gauges supplied by Mali-Météo.	Data is collected on rainfall only.	Data is communicated through private cell phones and monthly courier. For that they receive a small fee (15,000 CFA/year).	Data is stored at Mali-Météo and integrated on a monthly basis with the Digitized Climate Data Base.	Rainfall data is currently used by villagers and the GLAM to facilitate agricultural decision-making. The GTPA facilitates the provision of technical advice through radio and television. The system is not fully functional at this time because of lack of financial resources for GLAM.



### 3.3.4 Weather Data and Forecasting

Mali-Météo is best known for providing daily, weekly, bi-weekly, and monthly weather updates on parameters such as rainfall, temperature, evapotranspiration, wind direction, solar intensity, and haze. Mali-Météo no longer produces its own radio and television broadcasts, but rather provides updates to government and the press. These bulletins are distributed to radio and television stations and other interested parties free of charge on a regular basis. These detailed updates consist of warnings of impending heavy rains or other extreme events. A network of journalists works with Mali-Météo to interpret weather data and communicate this information to the general public. A dynamic communications officer liaises with the national media.

### 3.3.5 Agro-climatic Analysis

Period publications present basic information on the beginning, end, and length of the rainy season. They also present a provisional calendar for planting, estimations of yields, agro-climatic technical advice, and various bulletins monitoring bi-weekly and monthly weather trends.

Each year, the GTPA produces a summary of the agricultural situation and evolution of weather conditions. The multidisciplinary team of meteorologists, agronomists, and food security specialists prepares this review from data collected by the various ministries. Similarly, each month the Mali-Météo contributes to the *Bulletin SAP*. An excerpt of its summary for the Sikasso Region is provided on the following page as an example of the level of detail provided.

### 3.3.6 Weather Alerts

Mali-Météo provides alerts about impending weather events. The quality and timing of these alerts varies from place to place depending on the functionality of the weather stations and the efficacy of the local communication system. As the case of the August 28, 2013 severe flash flooding in Bamako shows (see the text box above), Mali-Météo was able to inform the urban population through civil defense systems, yet it lacks a sufficient number of vehicles to carry out damage assessments.

The Mali-Météo weather radar network of four operational units functioned reasonably well before the 2012/2013 security crisis. Radar-generated weather information primarily has been provided during the three prime months of the rainy season, when cloud formations and rainfall are highest and most severe. This information feeds into weather bulletins, and in severe events, to the National Civil Defense Directorate. Unfortunately, only three units are functional (Manantali, Bamako-Senou airport, and Mopti).

#### **FLOODING IN BAMAKO ON AUGUST 28, 2013**

On Wednesday, August 28, 2013, extremely heavy downpours surprised Bamako after two days of incessant rain. At the Mali-Météo station at Sotuba, 85 mm of rainfall were recorded. With the Niger rapidly rising and exceptionally heavy rainfall, massive flooding occurred throughout the city. Later, the Civil Defense Agency (DGPC) found that 37 people died, 19,000 were left homeless, and five schools were turned into evacuation centers. Over the radio and television, Mali-Météo had warned of impending downpours. Just prior to the storm, alerts were sent out to media. Without this effort, loss of life could have been much worse.



### 3.3.7 Agro-Meteorological Advisory Program

From 1982 to 2005, with assistance from the AGRHYMET and technical support from WMO, the Swiss Agency for Development and Cooperation (SDC) supported the Agro-Meteorological Advisory Program to provide climate information to rural communities with external funding from a number of bilateral and multilateral organizations and nongovernmental organizations. The program envisioned providing farmers, organized into “Local Agromet Assistance Groups” (GLAM), and pastoralists with climate information to help in decision-making. Variables include soil moisture availability for planting, appropriate dates for fertilizer applications, and location of rainfall to facilitate decisions on pasture use. First launched in 1982, the agro-meteorological project initially sought to identify whether and how climate information might be useful to farmers already receiving advice on seed selection, soil management, and crop rotation from agricultural extension officers. Farmers overwhelmingly requested information on the onset and end of the rainy season and the amount and distribution of rainfall (Dinku, Giannini, Curtis, and Mason, n.d.). Once these needs were identified, steps were taken to enable farmers to access and make use of this kind of information. As described by Moussa, Traoré, Zougmore, and Traoré (n.d.),

*“The project was highly innovative from the outset and the first in Africa for a national hydrological and meteorological service to supply climate-related advice and recommendations directly to local communities including farmers, and to enhance their capacity to measure rainfall themselves. Over the lifetime of the project, farmers were given rain gauges to measure rainfall in their fields, and were trained in taking measurements and using them in conjunction with sowing calendars, which indicated suitable planting dates and appropriate crop varieties in the different locations. The rainfall data collected reaches the multidisciplinary working group. The data was processed during the multidisciplinary fortnightly meetings. It is also during these meetings that agro-meteorological opinions, warnings and advice are formulated and circulated by means of the national radio and television, to the local community.”*

Mali-Météo continues to support this innovative program; however, as noted below, it cannot adequately cover recurrent costs. The GTPA meets each month during the rainy season with representatives of the institutions noted in the following text box to prepare and issue weather advisory bulletins and reports. The participation of the national and local radio stations ensures transmission of this information to rural populations primarily by radio.

**FIGURE 14. FARMER RAIN GAUGE**



**Farmer rain gauges sold by SIMPLAST for about \$6.00 per unit.**

*Source: Mohammed Boulahya*



The ARCC Mali Institutional Assessment team carried out a qualitative survey of rural peoples' perceptions of Mali-Météo. The presence of the Agro-Meteorological Advisory Program in the lives of rural people is illustrated by their close attention to weather reports and advisory services given over the radio. Unfortunately, lack of funding for Mali-Météo undermines the functionality of the GLAM local assistance groups, because field agents cannot get out as frequently as in the past to visit those using rain gauges. See Figures 11 and 12 for the approximate location of these sites. As is noted in these maps, outreach focuses on areas of higher rainfall and more densely populated parts of the country.

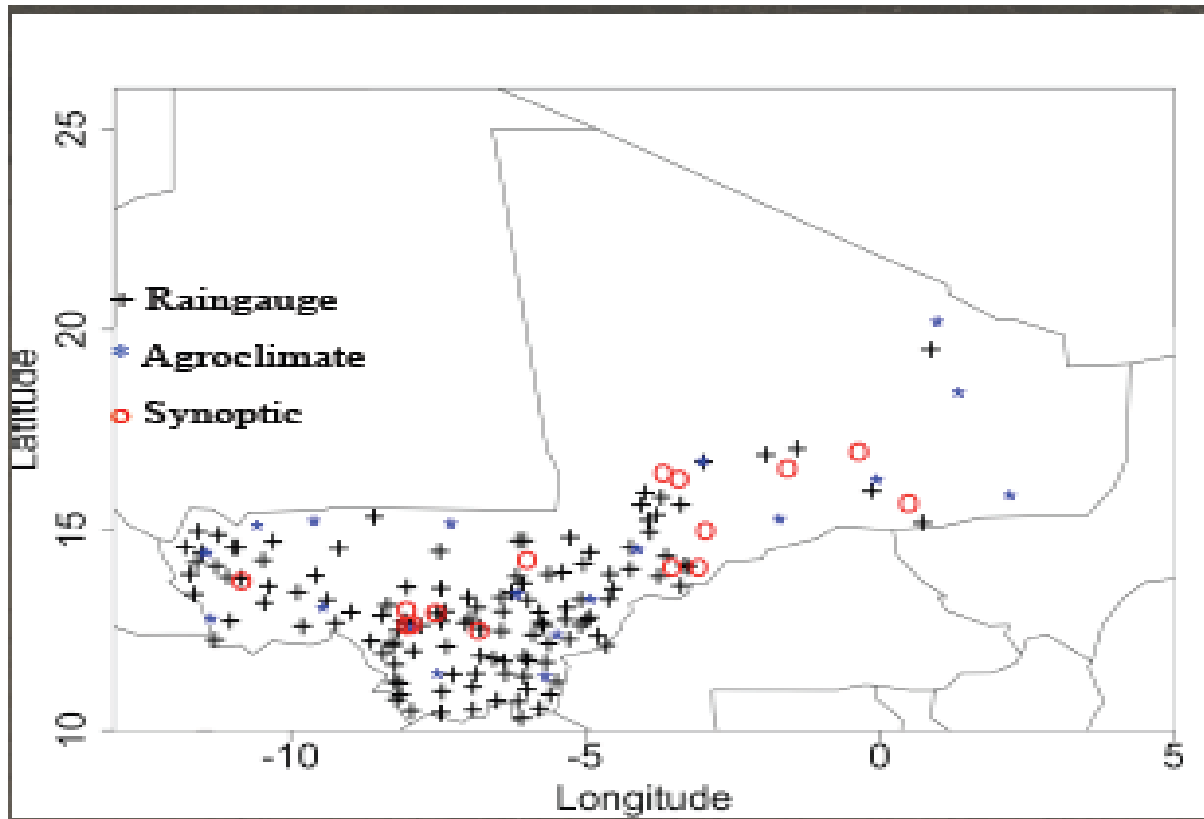
USAID contracted the University of South Carolina to carry out an in-depth impact assessment of this system. The assessment by Professor Ed Carr will greatly expand understanding of whether and how the government and the international community should support the GTPA.

## CURRENT MEMBERS OF GTPA

- l'Agence Nationale de la Météorologie (Mali-Météo)
- l'Agence pour la Sécurité de la Navigation Aérienne en Afrique et à Madagascar (ASECNA/Centre Météorologique Principal de Bamako-Senou)
- la Direction Nationale de l'Hydraulique (DNH)
- la Direction Nationale de l'Agriculture (DNA)
- l'Office de Protection des Végétaux (OPV)
- le Centre National de Lutte contre le Criquet Pèlerin (CNLCP)
- la Direction Nationale des Productions et des Industries Animales (DNPIA)
- la Compagnie Malienne pour le Développement des Textiles (CMDT)
- l'Office de la Haute Vallée du Niger (OHVN)
- le Système d'Alerte Précoce (SAP)
- Famine Early Warning System Network (FEWS/NET)
- l'Institut d'Economie Rurale (IER)
- la Direction Nationale de l'Intérieur (DNI)
- la Direction Générale de la Protection Civile (DGPC)
- l'Observatoire du Marché Agricole (OMA)
- la Direction Nationale des Services Vétérinaires (DNSV)
- la Direction Nationale des Eaux et Forêts (DNEF)
- la Coordination des Associations et ONG Féminines (CAFO)
- le Secrétariat de Concertation des ONG (SECO/ONG)
- le Comité de Coordination des Actions des ONG (CCA/ONG)
- l'Office de la Radio Diffusion et Télévision du Mali (ORTM)
- Local radio stations



**FIGURE 15. DISTRIBUTION OF WEATHER STATIONS  
AND RAIN GAUGES, JULY 2012**



Source: Carr, 2013



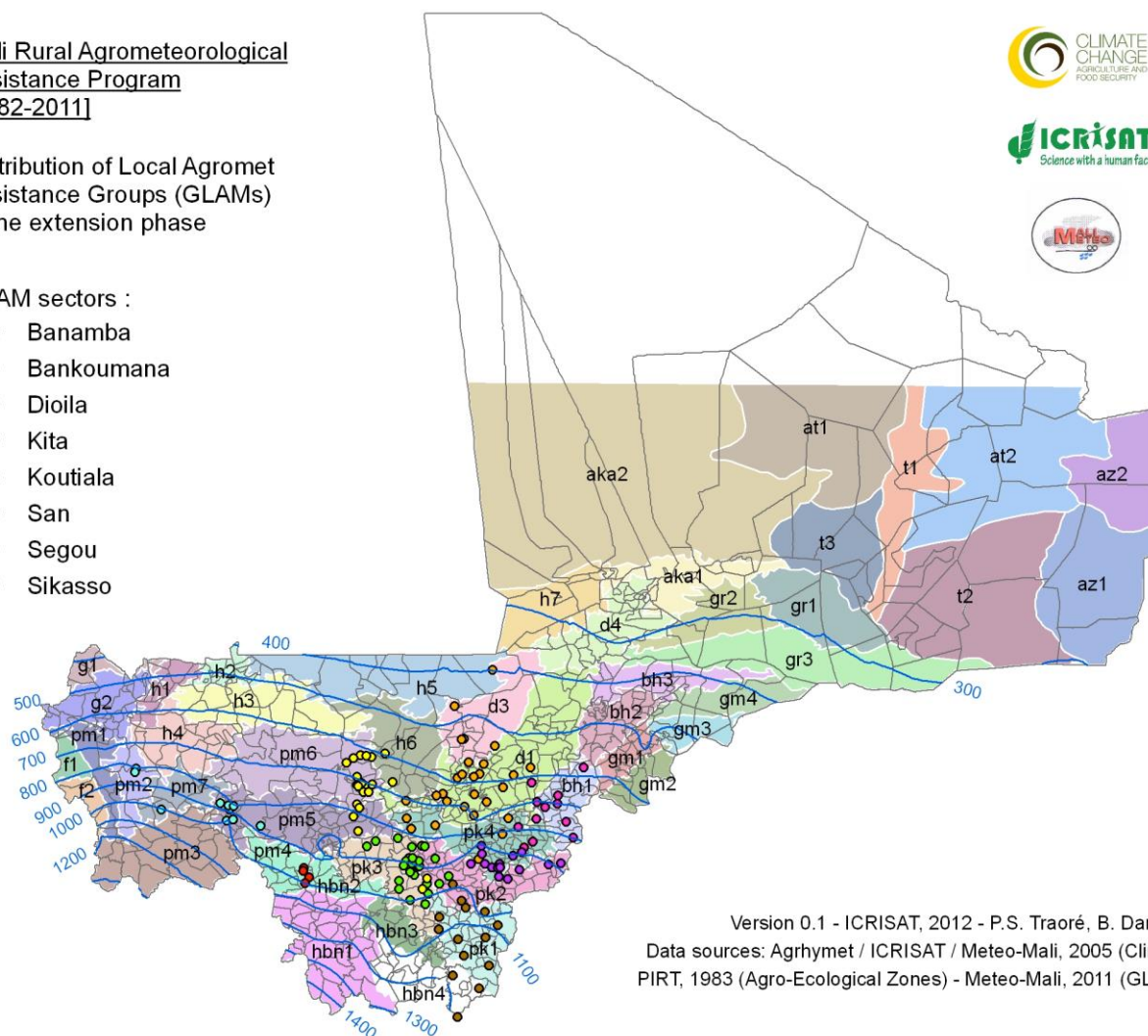
**FIGURE 16. MAP OF LOCATION OF GLAM GROUPS**

Mali Rural Agrometeorological  
Assistance Program  
[1982-2011]

Distribution of Local Agromet  
Assistance Groups (GLAMs)  
in the extension phase

GLAM sectors :

- Banamba
- Bankoumana
- Dioila
- Kita
- Koutiala
- San
- Segou
- Sikasso



Version 0.1 - ICRISAT, 2012 - P.S. Traoré, B. Dansoko  
Data sources: Agrhymet / ICRISAT / Meteo-Mali, 2005 (Climate)  
PIRT, 1983 (Agro-Ecological Zones) - Meteo-Mali, 2011 (GLAMs)



**BULLETIN METEO DU 07 AOUT 2013**

**PREVISION GENERALE DU TEMPS JUSQU 'A DEMAIN**

Le ciel sera nuageux à couvert, avec

Des vents de **Sud-ouest**, faibles à modérés sur toutes les régions à l'exception de l'extrême Nord de Tombouctou, où ils seront de Nord-est.

Des activités pluvio-orageuses se produiront dans la journée ou l'après-midi sur les régions de Koulikoro, Sikasso et Ségou et en cours de nuit sur celles de Mopti, Gao et le Sud de Tombouctou et Kidal.

La visibilité sera légèrement affectée par la poussière en suspension dans l'extrême Nord de Tombouctou et bonne sur le reste du pays.

Les températures maximales prévues pour la journée de demain sont: **37°C** à Tombouctou et à Kidal; **36°C** à Gao; **34°C** à Mopti; **32°C** à Kayes et à Ségou; et **31°C** à Koulikoro et à Sikasso. Et les minimales: **23°C** à Koulikoro et à Sikasso; **24°C** à Ségou et à Mopti; **25°C** à Kayes; **25°C** à Gao; **26°C** à Tombouctou; et **27°C** à Kidal.

**PREVISION DU TEMPS SUR BAMAKO ET ENVIRONS**

Le ciel sera légèrement ensoleillé, avec des vents de sud-ouest, faibles à modérés. Des manifestations pluvio-orageuses interviendront dans l'après-midi ou la soirée. Les températures minimale et maximale prévues pour demain, sont respectivement **21°C** et **30°C**.

***Le prévisionniste.***

Mali-Météo



## BOX 2. WEEKLY METEOROLOGICAL REPORT

### PREVISION HEBDOMADAIRE

Semaine du 01 au 08 Août 2013

n° 013/2013

#### A – Situation synoptique Générale

La situation synoptique au cours de la semaine du 01 au 08 Août 2013, sera caractérisée par

##### En Surface à 10 m :

##### **Vents**

- la prédominance des vents modérés à forts, de composante sud-ouest sur l'ensemble du pays;
- la persistance d'une cellule dépressionnaire sur la partie nord du pays;
- l'aspiration du flux de mousson jusqu'au-delà de la latitude de Tombouctou et Kidal ;
- l'installation définitive du régime de mousson sur l'ensemble du pays ;
- la poursuite du renforcement de l'humidité relative de l'air dans toutes les régions;
- l'épaisseur de la mousson atteindra les 2500 mètres ;
- le Front Intertropical (FIT) fluctuera entre la région de Tombouctou et celle de Kidal.

##### **Températures**

Au cours de la semaine les températures maximales et minimales connaîtront une baisse sensible, elles fluctueront comme suit:

- les températures maximales entre:
  - 30°C et 35°C dans les régions de Kayes, Koulikoro, Sikasso, Ségou et le District de Bamako ;
  - 36°C et 40°C dans les régions de Mopti, Gao, Tombouctou et Kidal.
- les températures minimales entre :
  - 20° c et 25°C dans les régions de Kayes, Koulikoro, Sikasso, Ségou et le District de Bamako ;
  - 26° c et 30°C dans les régions de Mopti, Gao, Tombouctou et Kidal

##### **Aérosol Surface : Visibilité, Vents**

Au cours de la semaine, la brume de poussière affectera les visibilités horizontales dans l'extrême nord de la région de Tombouctou, en les réduisant à moins de 5000 mètres..

Les vents varieront entre 70 et 90 km/h.

##### **A 850 hpa (1500 mètres): Températures, Humidité relative, Vents**

- les températures seront :
  - inférieures à 18°C dans les régions de Kayes, Koulikoro, Sikasso et le District Bamako
  - comprises entre 18°C et 21°C dans les régions de Ségou, Gao et Mopti
  - comprises entre 21°C et 24°C dans les régions de Tombouctou et Kidal
- le fort renforcement de l'humidité relative de l'air dans toutes les régions.
- les vents varieront entre 80 et 110 km/h.



## **B – PREVISIONS**

### **Pluies**

Les activités pluvio orageuses faibles à modérés et parfois fortes seront observées au cours de la semaine du 01 au 08 Août 2013 dans les régions, aux dates ci-après :

- 01 - 08-2013 : Régions : Kayes, Koulikoro, Gao, Dist Bamako : **pluies fortes;**
  - Sikasso, Ségou, Mopti, Tombouctou, Kidal : **pluies modérées**
- 02 - 08-2013 : Régions : Gao : **pluies fortes;**
  - Kayes, Koulikoro, Sikasso, Ségou, Mopti, Tombouctou, Kidal, Dist. Bamako : **pluies modérées**
- 03 - 08-2013 : Régions : Sikasso, Mopti: **pluies fortes;**
  - Kayes, Koulikoro, Ségou, Mopti, Gao, Tombouctou,
  - Kidal, Dist Bamako : pluies modérées ;
- 04 - 08-2013 : Régions : Kayes, Koulikoro, Dist Bamako : **pluies fortes;**
  - Sikasso, Ségou, Mopti, Tombouctou, Kidal, Gao: **pluies modérées ;**
- 05 - 08-2013 : Régions : Kayes, Kidal : **pluies fortes ;**
  - Koulikoro, Sikasso, Ségou, Mopti Gao ;
  - Tombouctou, Dist Bamako : **pluies modérées**
- 06 - 08-2013 : Régions : Kayes, Koulikoro, Ségou, Mopti, Kidal,
  - Gao, Dist Bamako : **pluies modérées**
- 07- 08-2013 : Régions : Koulikoro, Sikasso, Ségou, Mopti,
  - Tombouctou, Dist Bamako: **pluies modérées ;**
- 08-08-2013 : Régions : Koulikoro, Sikasso, Ségou, Mopti, Gao ;
  - Tombouctou, Dist Bamako: **pluies modérées ;**

### **Faits saillants**

De fortes probabilités demeurent quant aux risques d'inondation pouvant survenir au cours de la semaine dans les régions de Kayes, Koulikoro, Sikasso, Ségou Mopti, Gao, Tombouctou, Kidal et dans le District de Bamako.

**Bamako, le 01 Août 2013**

**RDV/SPE**



### 3.3.8 Providing Data for Climate Change Modeling and Conducting Analysis

The rural and urban populations of Mali are perplexed, as are people all over the world, by what they perceive as changing weather patterns. Expressions of this disquiet are commonly reported in studies on climate change in Mali. Carried out in January 2014, the ARCC Agricultural Innovations field analyses also highlighted uncertainty similar to that expressed in the adjoining text box. Unfortunately, the meteorological services of Africa generally lack the capacity and financial means to carry out high quality climate change modeling and long-term weather forecasting.<sup>16</sup> For this reason, AGRYHMET, ACMAD, and the research program, *Campagnes de Recherches Météorologiques dans la Région Afrique de l'Ouest* (from GATE in 1974 to AMMA in 2002), were set up. Despite cut-backs in funding, international institutions like the WMO and the United States NOAA program continue to support these institutions. Various regional and international agreements have been worked out to carry out much interpretation of climate and weather dynamics in the Sahel and in Mali. But these institutions depend on fine-grained weather data from the Mali-Météo network and perspectives of national meteorologists. Climate change modeling needs time-series data of 30 to 60 years; Mali-Météo has this data, but it is not easily accessible and is in a highly vulnerable condition.

The utility of weather archives for climate change analysis is enormous. When climate projections for an agro-climatic zone are robust and climate data is widely available, calibrated yield functions can be used to estimate the impact of climate change on crop yields. For instance, in their study on the impact of climate change on the agricultural sector in Morocco, Gommès et al. (2009) used weather data from the past 50 years to develop yield functions that relate historical yields to climatic conditions. These yield functions are then used to project much more robustly the possible impact of climate change on future yields. Long-term data sets are also useful for interpreting

#### VOICE FROM THE VILLAGE: THE NEED FOR WEATHER INFORMATION

“Today, we don’t know when we should begin to plant; the rainy season is no longer really here. Often we plant and then it does not rain, and then we must replant and replant. And then, these last years, the rains often stop earlier than in the past.”

– Farmer in the community of San, Mali (Intercoopération Sahel, 2008:10)

#### REGION DE SIKASSO

*La situation alimentaire est normale dans la région.*

*La hauteur mensuelle des pluies est de normale à excédentaire excepté à Sikasso et Koutiala où elle est de déficitaire à très déficitaire. Elle est partout inférieure à celles de l’année dernière sauf à Yorosso où elle est légèrement supérieure. Le cumul du 1<sup>er</sup> mai au 30 septembre 2013 est normal à excédentaire sauf à*

*Koutiala où il est déficitaire. Il reste partout inférieur à celui de l’année dernière à la même période.*

*La crue se poursuit sur tous les cours d’eau mais les niveaux sont inférieurs à ceux de l’année dernière à la même période.*

*(Bulletin SAP, no. 324, September, 2013)*

<sup>16</sup> See the USAID study commissioned by ARCC, “West African Climate & Early Warning Services (CEWS): Institutional Assessment & Research Options,” (October 2013) for a more detailed review of the international and regional weather and climatic services provided by these institutions. See also Kadi, M., Njau, L.N., Mwikya, J., Kamga, A. (2011). “The State of Climate Information Services for Agriculture and Food Security in West African Countries.” CCAFS Working Paper No. 4. Copenhagen, Denmark.



how weather patterns have changed in the recent historical past (e.g., shifts in rainfall isohyets to the south), and these data sets can contribute to construction of much stronger climate models. Similarly, if the national weather station grid is improved through the installation of new stations, data from neighboring weather stations with long and continuous databases can be used for analytical purposes without waiting at least 30 years for a robust picture of weather patterns.

Despite severe financial limitations to the national weather service institutions in Mali, from as far back as the 1980s Mali-Météo contributed to the national Climate Variability Assessment and later to the Climate Change Vulnerability Assessment, focusing primarily on the rural and agricultural sectors. Prior to the creation of Mali-Météo, the *Direction Nationale de la Météorologie* was the focal point to the UNFCCC and wrote the various reports and contributions for early discussions about the impact of climate change in the Sahel. Periodic updates of these assessments always involve Mali-Météo. Senior staff actively participated in the first Sustainable Development Rio-Conference in 1992 and, later, in every UNFCCC Conference of Parties up through the 17<sup>th</sup> Conference (Durban, December 2011). Since the early 1980s, Mali-Météo has collaborated closely with the Ministry of Equipment and Transport, the Ministry of Agriculture, and a wide range of external actors (WMO, AGRHYMET, ACMAD, the International Crops Research Institute for the Semi-Arid Tropics [ICRISAT], Climate Change Agriculture and Food Security [CCAFS], and IRI) to develop a range of weather and agro-climatological products serving the general public but targeted at farmers and pastoralists throughout the country.

Mali-Météo contributes its analytical expertise to various publications. For instance, on a monthly basis it generates a summary of the weather situation for the eight regions throughout Mali for the early-warning publication called the *Bulletin SAP*, a publication of the Ministry of Territorial Administration and Local Collectivities. These early-warning analyses are critically important for government and donor agencies to assess the food security situation throughout the country.

The various publications Mali-Météo and its predecessors produce are kept within the library and archives of the agency; however, there is no card catalog nor computerized retrieval system to facilitate online access. Printed documents are not well organized. Mali-Météo has no archivist.

#### *Precipitation Enhancement Program (PEP)*

Cloud seeding services, fully supported by the national budget, have been carried out since 2006. A government-contracted private firm conducts the seeding over a three-month period each rainy season. For this purpose, the government has purchased two light planes and invested in four weather radars. The program seems to be highly popular with the general public, who believe that this intervention indeed generates timely rainfall.

The government also views this service as an important contribution to smallholder agriculture under a changing climate. Further, it gains much political legitimacy from precipitation enhancement, even if the correlations between cloud seeding and beneficial rainfall are not scientifically demonstrated. It demonstrates timely action to alleviate the impact of sporadic dry spells, usually just at the end of the rainy season when crops are in a very vulnerable situation. Although the cost of the precipitation enhancement program is high and the resource drain on the Government of Mali is considerable, the government is under much pressure to extend the program to more regions and to expand cloud seeding from the current three months to six months.

### 3.3.9 Specialized Services

Through contracts and agreements, Mali-Météo provides specialized data and analysis and advisory agro-climate services through a fee-for-service system, which contributes somewhat to the costs of carrying



out studies and analysis on demand. Government agencies are supposed to pay for analyses of weather data, but complaints have been raised about a lack of budgetary resources for this purpose. A sliding payment scale has been devised whereby external actors, like engineering firms, pay cash for data and analysis. Students pay no fees for access to weather data. Cost recovery through sale of services accounts for only 5 percent of Mali-Météo's overall budget.

### 3.4 CHALLENGES

Mali-Météo has carried out internal assessments of its institutional strengths and weaknesses in preparation for its annual meetings with the Conseil d'Administration. Several analyses of internal management issues also have been prepared for review by the Ministry of Equipment and Transport and various donor delegations. In addition, financial and staffing issues have been reviewed in preparation for the World Bank project, *Projet de Résilience face aux Catastrophes dans le Sahel*. At the time of this report, these studies remained confidential. As a result of these various efforts, the agency's senior management team is very aware of the institution's challenges and has prioritized feasible future actions given its limited resources.

#### 3.4.1 Precarious Financial Situation

The Mali-Météo management team is confronting the fundamental difficulty associated with convincing the Governing Board to provide the necessary state support strongly needed to generate competitively priced and high quality weather-water-climate services. During the Governing Board's second meeting, held on February 8, 2014, the Government of Mali, confronted with the reality that many weather stations had been destroyed during the civil disturbances of 2012/2013 and that many others are in a dilapidated condition, indicated strong support to provide sufficient funds to build a necessary Weather Services Center to generate meteorological information needed to respond to natural catastrophes and ensure protection of people and property.<sup>17</sup> The Government of Mali plans to rehabilitate the current network of agro-meteorological stations and continue the support it has offered since 2006 for coping with sporadic dry spells through the cloud-seeding interventions of the PEP.

Mali-Météo currently receives an annual budget of about \$6.4 million. About 10 percent is allocated to the rehabilitation of damaged and antiquated meteorological stations. The cloud seeding of the PEP absorbs another 62 percent of the annual budget.

**FIGURE 17. MALI-MÉTÉO STORED ARCHIVES**



Some of the Mali-Météo weather archives are neatly boxed and nicely stored on metal shelves in the basement.

Source: Mohammed Boulahya

---

<sup>17</sup> Mali-Météo reports that 13 synoptic and agro-climatic stations — 35 percent of the weather station network — are no longer functional. The sites have been pillaged, and technical agents have fled. These sites are: Kidal, Tombouctou, Gao, Ménaka, Ansongo, Bourem, Hombori, Douentza, Niafunké, Diré Goundam, Tessalit, Gourma Rarhous, Koro and Bankass.



Despite such strong indications of support in the short term, the Mali-Météo management team confronts a bleak reality that public funding will likely decrease over time. Along with Mali-Météo's management autonomy comes the obligation to mobilize and procure a large percentage of its own internal sources of funding. While Mali-Météo is skilled at providing services to rural clients, it must improve its delivery of high quality, tailored, and localized weather-water-climate data to a wider range of actors. The agency's management is very aware of the need to develop a long-term business strategy to generate revenues to cover recurrent and capital investment costs in support of very well identified public and private advisory weather-water-climate services.

### 3.4.2 Precarious Staffing Situation

Mali-Météo will need additional staff in order to strengthen its service provision mandate. To support the administrative and financial accounting functions of the Agency, Mali-Météo recruited 12 high-level specialized management staff from 2012 to 2013. It nevertheless remains woefully understaffed even to fill its public services mandated responsibilities for disaster risk management such as preparing the public with weather warnings for flash floods, for which a few hours of advance warning can make an enormous difference for highly vulnerable populations. As of January 2014 the agency comprised 72 staff with a breakdown indicated in the below text box.<sup>18</sup>

The Mali-Météo headquarters houses 52 staff. The other 21 staff are weather observers assigned to particular agro-climatic stations. For stations that have been damaged or destroyed by civil disturbances, the staff are temporarily in Bamako or assigned to other stations. Simply to fully staff the agro-climatic stations according to international norms, Mali-Météo would need to add 36 observers, more than double the current number. However, if electronic meteorological stations were installed, only two observers per station would be needed to ensure operations and maintenance of the digital equipment, back-up collection of basis weather information, and expanded communication and outreach with

#### PROFESSIONAL COMPOSITION OF MALI-MÉTÉO STAFF

29 percent	Meteorological Engineers
36 percent	Meteorological Technicians
0 percent	Information Management Engineers
0 percent	Archivists
35 percent	Administration and Finance

surrounding rural and urban populations. Most stations have only one observer who collects and reports weather data, whereas standard international norms call for three staff per station to assure full coverage. Despite these single observers' heavy work load, they nevertheless do their best to record and send data to headquarters; however, they do not have sufficient time to deliver advisory services to the communities around their station. This same situation occurred even at the better-financed agro-climatic station at Sotuba, which the assessment team visited.

ASECNA and ANAC staff the 19 Synoptic Stations. For the time being, these staff remain on the payroll, and management of these two institutions is financed by the aviation industry. The Synoptic Stations are

<sup>18</sup> The academic qualifications follow: meteorological engineers (Baccalaureate plus four to five years of university); meteorological technicians (Baccalaureate plus three to four years of higher education, but more practical than theoretical); archivist (two to three years plus two to three years of higher education of a practical nature); and administration and finance (Baccalaureate plus three to four years of superior studies).



to be integrated at some time into Mali-Météo as mandated by law, but the ARCC Mali Institutional Assessment team does not feel that the agency has the financial means to pick up the considerable staffing burden of at least 71 additional staff (nine meteorologists as well as 62 observers and support staff). Mali-Météo should not push for integration at this time, but rather should focus on diversifying its portfolio of sources of funding and on improving services for the general public and especially for rural peoples.

The agency sub-contracts the management of the three radar stations (Manantali, Gao, and Bamako) to private firms for the three-month height of the rainy season, when the cloud-seeding program is in operation. The PEP covers the cost of this seasonal expenditure, and unfortunately this strategic rain monitoring equipment is inoperative during the rest of the year for lack of operational resources.

To attempt to address some of these staffing needs, the agency is creating a formal network of producers and users of meteorological information (*Cadre national des services climatologiques* [CNSC]) within the Global Framework for Climate Services that was established with WMO support following the recommendations of the September 2009 World Climate Conference 3. In September 2013, a network of 22 journalists interested in learning more and communicating better on the weather-water-climate events was established, with the secretariat headed by a special advisor on communications at Mali-Météo.

### 3.4.3 Retirement

The Mali-Météo technical personnel is aging. With a total of 45 technical staff at this time, the agency reported to the *Conseil d'Administration* in early 2014 that 31 will retire in the next seven years. Although no long-term staff replacement plan has been put in place, the retirement of 97 percent of skilled meteorological specialists within the next seven years is a central concern for the agency. These are staff with varying degrees of professional training, but they hold a long and deep knowledge from decades of experience collecting and interpreting weather data with the means at their disposal.

While this situation affects the long-term viability of Mali-Météo, the pool of retired but qualified staff is also an opportunity. Since much of the senior technical staff of Mali-Météo will retire in the next few years, these staff should now begin to consider retirement plans. With such skill and experience, as consultants, retired staff could provide much-needed training and mentoring to the new cadre of technicians. Mali-Météo may also need to sub-contract out analytical services during this period of transition to highly-skilled meteorological specialists.

Retirees should consider setting up a private consulting firm to offer services not only to Mali-Météo but to institutions needing high quality data and analysis. The demand for “à la carte” meteorological services is high. Consulting firms of retired Mali-Météo staff would help spur demand for high quality meteorological data that only Mali-Météo is able to collect. These services would also create healthy competition within this sector. Mali-Météo can learn from other countries, like Tanzania, that struggle with the same issues and have put in place autonomous weather services (Tanzania Meteorological Agency, 2008).

#### STAFF DEPARTURES

- Six staff in January 2014
- Four staff in 2015
- Three staff in 2016
- Four staff in 2017
- Two staff in 2018
- Two staff in 2019
- Ten staff between 2020-2022



### 3.4.4 Infrastructure

The agency's severe resource constraints threaten Mali-Météo's network of weather stations. In addition to the damage suffered during the disturbances of 2012/2013, most of the short-wave radios need repair; consequently, data from stations are sent through the precarious national postal system. Much of the weather monitoring equipment Mali-Météo manages is now obsolete, and the lack of funding prevents the maintenance of vehicles needed to visit weather stations and to provide services to the GLAM.

The Mali-Météo television studio has been dysfunctional for the past year. It no longer produces its own weather bulletins, but rather works through the national television station (ORTM) to broadcast televised weather information.

As a result, Mali-Météo can no longer generate advertisements about the farmer rain gauges SIMPLAST sells at a cost of \$6.00. According to SIMPLAST's commercial director, sales declines have been linked to the abandonment of national advertising. But the ARCC assessment team found that agricultural outlet stores in Bamako were willing to sell these rain gauges and instructions along with seeds, fertilizers, and other inputs. More aggressive marketing is needed to meet apparent demand.

Data from synoptic stations managed by ASECNA is manually transferred each day by someone carrying a flash disk to the Mali-Météo headquarters. The agency urgently needs to establish a fiber-optic cable or radio linkage between ASECNA, ANCA, and its headquarters to facilitate the rapid transmission of data from the airport Weather Center and the Synoptic Stations. International donors could play an immediate positive role by contributing to the payment of this relatively low-cost investment that would rapidly augment the capacity of Mali-Météo to offer even more accurate and timely weather forecasting and weather alerts.

### 3.4.5 Information Management

Mali-Météo's information management and information dissemination services are also in decline due to internal budgetary constraints. While Mali-Météo provides state-of-the-art service to the aviation industry through its contract with ASECNA, this arrangement is not completely transferable to other sectors. The contract with ASECNA is structured around providing weather information on a nearly instantaneous basis for national and international airline operations and safety. While the narrow focus can be criticized, the reality is that ASECNA will not cover the costs of analytical services such as the climate change assessments that consider the long-term evolution of weather patterns. This mandate is clearly within the purview of Mali-Météo, but at this time it cannot generate the revenue it needs to hire qualified staff.

**FIGURE 18. MALI-MÉTÉO ARCHIVES**



**Archives being sorted and placed on shelves in the basement of Mali-Météo.**

*Source: Mohammed Boulahya*



The production of weather data from most weather stations outside of Bamako is antiquated. While Mali-Météo ascribes to standard procedures for periodically recording data throughout the day on specialized forms, the transmission to the Bamako headquarters continues to occur by post. Once in Bamako, data is manually entered from monthly summaries into electronic databases.

The data collection, recording, and transmission could be much improved through the use of new electronic weather station technologies tied to the national cell phone network that now covers roughly 80 percent of the country. For instance, Davis Instrument weather stations (<http://davisnet.com/weather/>) are one of many types of relatively inexpensive stations that can measure barometric pressure, temperature, humidity, rainfall, wind speed and direction, UV/solar, and other parameters not collected by hand at the agro-climatic stations. Opportunities for the two cell phone companies to provide dial-in weather services are not being pursued at this time, though the Orange cell phone company would look forward to developing this service.

### 3.4.6 Software Databases

Mali-Météo uses four systems to manage and analyze the electronic data it receives from national and international sources. While the database management systems (CLICOM, CLIMBASE, CLIMAT, CLIDATA, and SGBD) are functional, the backup systems are at risk. Anti-virus software needs updating, and no cloud-based or multiple-server backup system exists.

### 3.4.7 Archival Database

The Mali-Météo houses sources of rich paper and digital archives from data collected at the weather stations noted above. The archival database covers the enormous land mass of Mali from the dry desert to the North, through the more humid Sudano-Sahelian zones of the Southwest.

The national weather archives are in a fragile, if not deplorable, condition. While the paper archives are now located in the basement of the Mali-Météo office in Bamako in clean and locked rooms, and Mali-Météo staff have sorted some stations by year from the origins to the latest paper records (see Figure 18), documents have never been scanned, and copies have not been deposited in other locations. If ever a fire or flood were to occur in the basement of Mali-Météo, an historical record of climate change leading back to the 1890s would be irretrievably lost. In past years, the tons of documents have been moved three times between facilities. Each time, fragile papers are further placed at risk or are lost. Even though all files recently have been placed on shelves, and stocks of sand have been placed strategically near entrances as a fire retardant, civil disturbances or unforeseen accidents could lead to the total destruction of more than 100 meteorological data collection points leading back to weather observations from 1895 in Kayes, Nioro du Sahel, and other points of reference.

Electronic databases are housed in computers in the central offices. The database houses the manually recorded data that comes from the Agro-Climatic and Observation Stations. The data can be accessed by staff trained to generate summaries of this data for various users, but the information storage and

**FIGURE 19. MALI-MÉTÉO BASEMENT WHERE ARCHIVES ARE STORED**



**ARCC Institutional Assessment team members Henri Lo and Mark Freudenberger in the Mali-Météo basement. Archive rooms are in the background; the central courtyard floor consists of sand placed there as a fire retardant.**

*Source: Mohammed Boulahya*



retrieval systems are very fragile. Electronic databases are vulnerable to hard disk crashes, and worse, theft or damage to the existing computer hardware. Anti-virus programs are out of date. Backup systems for weather data are weak. Office staff tend to back up data on personal flash disks that are stored in purses or pockets.

### 3.4.8 Agro-Meteorological Advisory Program

Mali-Météo continues to view the Agro-Meteorological Advisory Program as a key service to farmers throughout Mali. As the Mali-Météo 2013-2014 annual report noted, “It has been scientifically demonstrated since 1987 that this service contributes to a substantial increase in yields of millet, sorghum, corn, and cotton of at least 25-30 percent” (Mali-Météo, 2014:3). Despite the importance of the program, it is threatened by a lack of adequate financial support. Mali-Météo confronts enormous difficulties in visiting the community-level advisory groups, the *Groupe Local d’Assistance Météorologique au Monde Rural*.

USAID contracted the University of South Carolina to carry out a post-hoc impact assessment of the Agro-Meteorological Advisory Program that, in effect, assesses whether the assertion noted above is indeed verifiable. If meteorological data and training is provided to farmers and this assistance generates significant yield increases, then this intervention is a relatively low-cost and effective way to improve agricultural productivity. Dr. Edward Carr of the Department of Geography launched the Agro-Meteorological Advisory Program impact assessment in February 2012. The preliminary draft assessment from August 2012 noted the challenges of carrying out an impact assessment using control and treatment groups. Nevertheless, initial visits to 36 villages were carried out, 114 focus group interviews were held, and 720 farmers were interviewed. The results of the study highlighted the difficulties of determining impacts of weather information and technical services of the Agro-Meteorological Program on yields (Carr, 2013). Further research was carried out in May/June 2014. Informal communications with the research team suggest that there are large variations in the use of advisories and their impact on different clusters of villages as well as among men and women farmers. Further research will examine farmer decision-making to understand what meteorological products work best for different types of rural information users.



TABLE 2. STATE OF EQUIPMENT IN MALI-MÉTÉO SYNOPTIC STATIONS

19 Synoptic Weather Stations: Status of Meteorological Equipment, December 2013

Synoptic STATION	Sur-face Wind Speed	Baro-meter Air Presure	Theodolite Wind-Profiler	Heliograph Sun Shine Recorder	Barograph Air Presure Recordings	Thermo-graph Temperatur Recordings	Diesel Generator	Hydrogen Generator	SSB Radio (BLU) Modems	Data Collection Platform DCP Tel	Solar Radiation Integrator
Tessalit	Red	Green	Green	Green	Green	Green	Green	Green	Red	Green	Red
Kidal	Red	Red	Red	Green	Red	Red	Red	Green	Red	Red	Red
Timbuctu	Green	Green	Red	Red	Red	Red	Green	Green	Red	Green	Red
Gao	Green	Green	Red	Green	Green	Green	Green	Green	Red	Green	Red
Nioro	Red	Green	x	Green	Red	Red	Red	Green	Red	Green	Red
Nara	Red	Green	Red	Green	Green	Green	Green	Red	Red	Green	Red
Yélimané	Red	Green	x	Green	Green	Green	Green	x	Red	Green	Red
Hombori	Red	Green	x	Red	Red	Green	Green	x	Red	Green	Red
Ménaka	Red	Red	x	Green	Red	Red	Green	x	Red	Red	Red
Kayes	Red	Green	Red	Green	Red	Red	Green	Green	Red	Red	Red
Mopti	Red	Red	Red	Green	Red	Green	Green	Green	Red	Green	Red
Kita	Red	Green	x	Green	Red	Green	Green	x	Red	Green	Red
Ségou	Red	Red	Red	Green	Red	Red	Green	Red	Red	Green	Red
San	Red	Green	x	Green	Red	Red	Red	x	Red	Green	Red
Kéniéba	Red	Green	x	Green	Green	Green	Green	x	Red	Green	Red
Bamako - Sénou	Red	Green	Green	Green	Green	Green	Green	Green	Red	Green	Red
Koutiala	Red	Green	x	Green	Green	Green	Green	x	Red	Green	Red
Bougouni	Red	Red	x	Green	Red	Red	Green	x	Red	Green	Red
Sikasso	Red	Red	x	Green	Green	Red	Red	x	Red	Green	Red

Red : Poor Status

Green : Good Working Conditions

x : No upper air observation at these stations

Source: Mali-Météo, December 2013



TABLE 3. STATE OF EQUIPMENT IN MALI-MÉTÉO AGRO-CLIMATIC STATIONS

10 Agroclimatic Weather Stations: Status of Meterological Equipment, December 2013										
Agro-Climatic STATION	Surface Wind Speed	Barometer Air Presure	Theo-dolite Win-d-Profiler	Heliograph Sun Shine Recorder	Barograph Air Presure recordings	Therm-graph Temperatur e Recordings	Diesel Generator	Hydrogen Generator	SSB(BLU) Modems	Data Collection Platform DCP Tel
Dioila	Red	Yellow	Green	Red	Green	Red	Red	Red	Green	Yellow
Djidieni	Red	Yellow	Yellow	Green	Yellow	Red	Red	Red	Yellow	Yellow
Niono	Red	Yellow	Yellow	Red	Yellow	Red	Red	Yellow	Yellow	Yellow
Kogoni	Red	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow
Mahina	Red	Yellow	Yellow	Green	Green	Red	Red	Red	Yellow	Yellow
Diré	Red	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow
Goundam	Red	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow
Ansongo	Red	Yellow	Yellow	Green	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow
Ménaka	Red	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow
Bourem	Red	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow

Red : Poor Status

Green : Good Working Conditions

Yellow : nil

Source: Mali Météo, December 2013



TABLE 4. STATUS OF AGRO-CLIMATIC STATIONS

N°	Station	Abri	Psycro m.	Thermo graphe	Hygrogr aphe.	Station Vent	Baromètr e.	Barograp he.	Pluviomèt re.	Pluvigra phe.	Hélio graphe.	Bac A	BLU	Clôture Parc
1	Didiéni	HS	Passable	Passable	Passable	HS	X	X	Bon	Mauvais	Bon	X	HS	Passable
2	Mahina	Passable	Bon	Passable	Passable	H.S	X	X	Bon	H.S	Bon	Mauvais	HS	Mauvais
3	Niono	HS	Passable	X	X	X	X	X	Bon	HS	X	Pas de jauge	X	Mauvais
4	Sélingué	Bon	Bon	Bon	Bon	X	X	X	Bon	Passabe	Bon	Passable	X	Passable
5	Katiboug ou	Mau-vaïs	Bon	Bon	Mauvais	X	X	X	Bon	Mauvais	Bon	Pas de jauge Sup.Mauv	X	Mauvais
6	Bko-Ville	Mau-vaïs	Passable	Bon	Bon	X	X	X	Bon	Pas de diagramme	Bon	passable	X	Bon
7	Sotuba	Passable	Bon	Bon	Bon	x	X	X	passable	HS	Bon	Passable	X	Passable
8	Dioïla	Mauvais	Passable	Bon	Bon	X	Bon	Passable	Mauvais	X	Bon	Passable Sup.mauv	X	Mauvais
9	Bourem						La clôture grillagée du parc et l'ensemble des équipements détruits							
10	Ansongo						La clôture grillagée du parc et l'ensemble des équipements détruits							
11	Goundam						La clôture grillagée du parc et l'ensemble des équipements détruits							
12	Djiré						La clôture grillagée du parc et l'ensemble des équipements détruits							
13	Niafunké						La clôture grillagée du parc et l'ensemble des équipements détruits							
14	Gourma Rarhouss						La clôture grillagée du parc et l'ensemble des équipements détruits							
15	Douentza	Mauv-ais	passable	bon	Mauvais	X	X	X	Bon	Mauvais	bon	x	X	passable

**NB :** H.S = Hors Service ; Mauv. = Mauvais ; X = Equipement Inexistant ; \* = girouette Opérationnelle ; Anémomètre n'existe pas ; sup= support.

**Priorité en termes de Station :** Didiéni, Niono, Selingué, Mahina, Katibougou, Bamako Ville, Sotuba, Diola, Douetza.

**Priorité en termes d'équipements :** Abri Grand modèle et équipements complet a l'intérieur, Baromètre numérique, Pluviographe station, rayonnement et surtout les consommables,

**Dans les localités de :** Bourem, Ansongo, Goundam, Djiré, Niafouké et Gourma Rarhous, l'ensemble des équipements ont été détruites.



### 3.5 PROGRAMMATIC OPTIONS

The ARCC Mali Institutional Assessment of Mali-Météo presents and prioritizes the following programmatic options structured around the functional categories of the World Resources Institute's "National Adaptive Capacity Framework" and the USAID "Project Design Sustainability Analysis Tool." Our assessment goes one step further by identifying which options could be carried out in a short-term (one year or less) or longer-term (two to five years) timeframe. While the detailed recommendations below may appear somewhat repetitious, this flaw is a reflection of the interconnected nature of programmatic options structured around the functional categories used in this institutional assessment. The table of programmatic priorities is summarized below in Table 5.

#### 3.5.1 Improve Climate and Weather Assessment Capacity

With its new status as a public enterprise with financial autonomy, Mali-Météo has been deeply challenged by severe budget constraints during its first three years of operations (2012 to 2014). With demand growing for Mali-Météo services, an urgent need emerges to increase the fee-for-service capacity of Mali-Météo in order to provide a wide range of analysis and data. But the agency confronts a looming crisis of imminent retirement of key staff at a time when weather stations are deteriorating or have been destroyed by the disturbances of 2012/2013. The central recommendation of this section is to support initiatives to rehabilitate and expand the capacity of Mali-Météo to collect and disseminate much-needed weather data for a wide range of climate change analysis and also for a wide range of programmatic uses for adaptation and mitigation. Without a robust foundation of functional weather stations, the Mali-Météo mandates cannot be carried out.

##### **Option #1: Rescue National Weather Archives.**

Urgently rescue the highly vulnerable Mali-Météo weather archives stored in the basement of the headquarters. Digitize and store these documents in national and international databases for future analysis and broad public use. The first action will consist of manually organizing all the climate archives by weather station and by measured parameter, starting with rainfall, then temperature, and then solar radiation. With the support of a Malian company specialized in archival protection, Mali-Météo staff could complete his initial categorization of the archives. This firm could employ retired Mali-Météo staff who know the collection well.

After this initial stock-taking, support from ACMAD and the International Environmental Data Rescue Organization (IEDRO) could be negotiated to photograph or microfilm the most fragile documents. More resilient papers could be scanned directly. The initial inventory of the archival collection would lead to an estimation of the overall cost of scanning all the archives and placing these images into a database accessible to the public. Other digitized information on Mali weather is available at ACMAD, AGRHYMET, and other climate centers like Météo-France that continue to house some data from the pre-independence period.

**FIGURE 20. MALI-MÉTÉO WEATHER ARCHIVES**



**ARCC Institutional Assessment team members Henri Lo and Mark Freudenberger review original weather station archives in the basement of Mali-Météo.**

*Source: Mohammed Boulahya*



**TABLE 5. PROGRAMMATIC PRIORITIES FOR MALI-MÉTÉO**

Time-Frame	Activity	Priority
<b>Short-term (1 year)</b>		
	1. Promote a Business Strategy and Action Plan	*****
	2. Estimate Cost of Rescuing National Weather Archives	*****
	3. Prioritize Weather Station Rehabilitation	*****
	4. Complete Impact Evaluation of Agro-Meteorological Program	*****
	5. Construct Data Transmission Link between ASECNA, ANAC, and Mali-Météo	*****
	6. Support Public-Private Partnerships for Meteorological Services	*****
	7. Introduce and Test Automated Weather Stations	*****
	8. Clarify Mali-Météo Institutional Mandate	***
<b>Longer-term (2-5 years)</b>		
	1. Rescue National Weather Archives	*****
	2. Expand Communication and Outreach	*****
	3. Develop Staff Capacity Improvement Plan	*****
	4. Promote Ethos of Fee-For-Service Payments	*****
	5. Prepare Mali-Météo proposals for Submission to the AEDD Climate Fund	*****
	6. Rehabilitate Existing Weather Stations	*****
	7. Carry-Out Cost-Benefit Analyses Justifying Weather Services	*****
	8. Expand Weather Station Network	*****
	9. Coordinate Infrastructure Improvement	*****
	10. Improve Computer and Data Management Capacity	*****
	11. Build the Capacity of Mali-Météo Technical Staff to Carry Out Climate Change Analysis	*****
	12. Explore Private Sector Diversification of Meteorological Services	***
	13. Diversify Climate Services	***
	14. Develop and Disseminate a Customer Service Charter	***
	15. Establish a Climate Sciences Committee	**



The cost of the initial inventory may be between \$45,000 and \$60,000 and would include the cost of organizing the existing paper archives, evaluating the cost for microfilming and digitizing the collection, and preparing a plan of action for protecting the collection and placing it in the public domain. Specialized meteorological archiving organizations like the IEDRO Foundation, which is very well known in Africa and supported by USAID and NOAA, are specialized in this task (see their website at: <http://www.iedro.org/>).

**Option #2: Complete Impact Evaluation of Agro-Meteorological Advisory Program.** Work closely with the University of South Carolina to utilize the assessment of the Agro-Meteorological Advisory Program to help Mali-Météo redesign the program to meet the high demand for services in a constrained fiscal climate. To the greatest extent possible, users of agro-meteorological information should be asked to contribute to the costs of collecting and analyzing weather information because the government does not have the means to fully subsidize these expenditures. As further noted below, cost recovery can take various forms. For rural users of weather information, Mali-Météo might be able to obtain some cost recovery through the sale of high quality data and analysis to radio stations and cell phone services used by rural populations. Obviously, rural farmers and pastoralists in Mali do not have the means to cover the full costs for the provision of weather data; however, through modest fees attached to communication and outreach services, they may be able to contribute to some degree. While at this time, it is not clear that direct causality can be established between utilization of weather information, technical advisory services, and higher yield, it appears that those involved in the impact evaluation could provide a wide range of useful recommendations to improve the efficacy of the Meteorological Advisory Program.

**Option #3: Rehabilitate Existing Weather Stations.** As suggested in the below sections, work closely with interested ministries and departments within the Government of Mali as well as regional and international meteorological organizations to invest in the rehabilitation of the existing Mali-Météo network of weather stations and radar facilities. Tables 2, 3, and 4 above illustrate quite well the status of various types of weather stations; however, as of now, no complete prioritized list has been developed. Mali-Météo needs to bring together stakeholders to determine among themselves which stations are of highest priority for rehabilitation in relation to need, costs of operation, and maintenance. Admittedly, this decision-making process will be difficult, but firm decisions are needed to guide infusions of new capital into priority sites. Internal and international support for the rehabilitation of priority weather stations should also be contingent upon the preparation of a robust business plan that determines the mechanisms to cover costs of operations and depreciation.

Rehabilitation should consist of the physical reconstruction of buildings, but there also should be investments in modern electronic weather collection stations that generate a continuous feed of weather data to a central Mali-Météo facility. It is likely that the rehabilitation of the radar station in Gao would be a top priority as well as the weather station in Mopti; however, security concerns remain real. Electronic data can be fed to Mali-Météo in the majority of cases through the existing cell phone service.

**FIGURE 21. PORTABLE WEATHER STATIONS**



**Weather stations such as this model can transmit data over cell phones and be powered by solar power.**

*Source: Davis Instruments, n.d.*



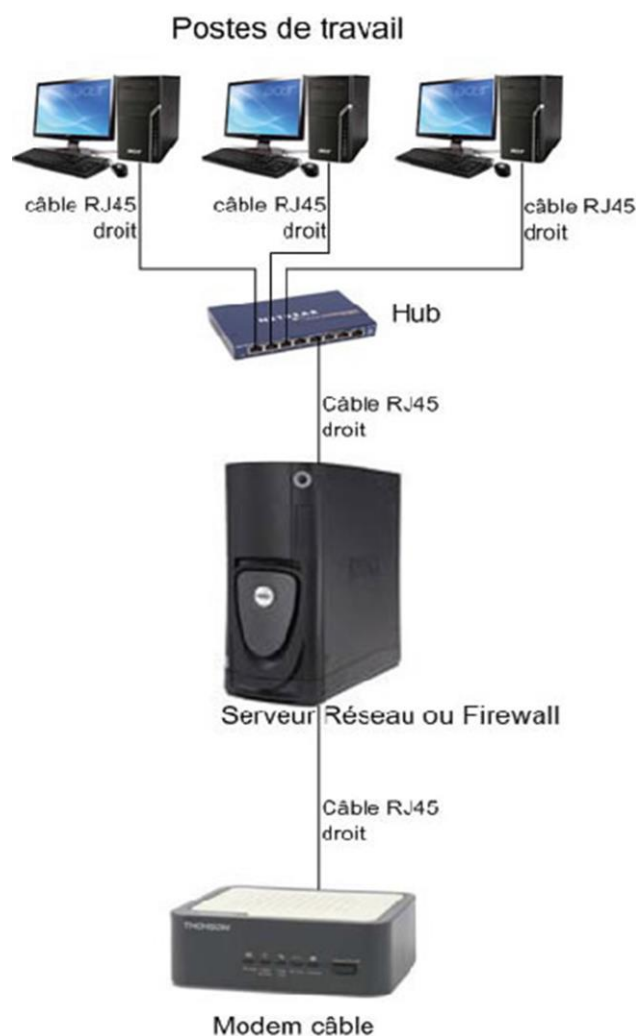
Part of this recommendation would be to explore options to use automated weather stations like those suggested below, because the use of these technologies will reduce the need to place as many personnel at each site while at the same time increasing the accuracy of collected information. That said, backup weather information systems based on manual observations that have been long used in Mali should be continued, and communication of such data through rehabilitated BLU radios should be continued until the new electronic weather stations are thoroughly tested in different parts of the country.

Current weather stations need to be updated with weather collection technologies that provide a constant stream of high quality weather data over a 24-hour period, seven days a week. International meteorological specialists need to be engaged to help Mali-Météo identify the most robust technology that minimizes energy needs and maximizes the potential of direct digitization and immediate transmission of data through the existing telecommunication network in Mali, which is powered with solar energy. Rehabilitation of stations will cost anywhere from \$10,000 for simple repairs and new equipment to \$100,000 for more systematic reconstruction of stations damaged by the recent civil disturbances. The sites of Ménaka, Timbuctu, Kidal, Mopti, and Ségou are the most expensive sites because of delayed maintenance as well as destruction during the recent civil disturbances. Mali-Météo has developed a list of costs for repairs, though prices may be brought down if automated stations were to be introduced. Mali-Météo should be applauded for its efforts to rehabilitate some stations, and commitment to continue these efforts appears to remain strong after the February 2014 Governing Board meeting.

**Option #4: Introduce and Test Automated Weather Stations.** At a nearby agro-climatic station (e.g., at the Sotuba agricultural station), introduce a robust electronic weather station like those constructed by Davis Instruments and other companies in order to test the functionality and durability of the semi-automated system.

Operations of an automated station take much less labor (for example, one Mali-Météo agent for each station rather than the current three), provided that the national cell phone infrastructure remains robust for transmission of electronic data. Robust and relatively inexpensive automated weather stations on the market could survive the harsh weather conditions of Mali, but no technology will withstand the destruction caused by insecurity.

**FIGURE 22. FIBER OPTIC CABLE FOR MALI-MÉTÉO AND ASECNA DATA TRANSMISSION**



Source: Mohammed Boulahya



The updating of technologies used to collect weather data at synoptic and agro-meteorological stations is certainly fraught with many risks and uncertainties. Mali-Météo should embark on a pilot program to pilot progressively automated weather stations and data transmission processes. A wholesale adoption of untried new technologies should be avoided. As a first step, a short-term technical assessment should be carried out in the near future to explore which type of automated weather station technology is the most appropriate for the various geographical and security conditions of Mali.

Through a cautious program of experimentation and scaling-up, an automated station could be first tested at the Soutuba agro-meteorological station in Bamako; if successful, it could be expanded to another region. It would be best to focus on one region, such as Mopti, that has long been underserved but is also extremely vulnerable to weather variations. Expansion of the weather data collection network also must be accompanied by improved communications and outreach not only to the general public, but also to interests willing to pay for weather services and analysis.

**Option #5: Construct a Data Transmission Link between ASECNA, ANAC, and Mali-Météo.** An urgent and short-term priority is to build a connection between the ASECNA Weather Information Center at the Bamako-Senou airport and the nearby headquarters of ANAC and Mali-Météo to assure the instantaneous transmission of data from the Synoptic Stations under ASECNA management to these agencies. This effort would greatly speed up weather forecasting and particularly weather alerts such as those for flash floods. All that is needed is to lay a fiber optic cable over a 1-2 km length from the airport to these two agencies or the installation of a data-transmitting short-wave radio (BLU). The total cost of the fiber optic cable and associated hardware and software is estimated to be about 37.8 million CFA (about \$80,000). This low-cost measure alone would tremendously increase the data available to Mali-Météo for weather reporting and alerts.

### 3.5.2 Prioritization

At this time, Mali-Météo focuses on the rehabilitation of the existing network of weather stations. This priority is key and appropriate; however, the agency needs to expand its capacity to deliver an array of more reliable and sophisticated weather information to a broader set of clients in both the public and private sectors.

**Option #1: Coordinate Infrastructure Improvement.** In a coordinated fashion, identify and secure the necessary resources from government, international donors, and private sector partners to expand agro-climatological analysis while rehabilitating the climate observation network. Mali-Météo must work with the Ministry of Equipment and Transport to effectively coordinate the provision of inputs for infrastructure rehabilitation.

**Option #2: Staff Capacity Improvement Plan.** Increase the skill level of Mali-Météo research staff to interpret and disseminate climatological analysis from the increasingly wide range of data sources while planning for the replacement of operations staff that will retire during the next four years. Support Mali-Météo in developing a Staff Capacity Improvement Plan for present staff in addition to a Recruitment Strategy to replace staff soon approaching retirement. Existing staff need to be retrained on electronic data management retrieval, archival management, analytical research, and service delivery to meet new expected contractual obligations from the public and private sectors. Among the many needed improvements, Mali-Météo's technical staff should strengthen their abilities to interpret and run climate models with the objective of producing climate scenarios for the eight regions in Mali.

The detailed capacity improvement analyses described here could be supported through short-term technical assistance of specialists who are qualified in those areas. A Staff Capacity Improvement Plan would spell out for each staff member a professional growth strategy of training and mentoring. A



Recruitment Strategy would be linked to the Business Development Plan described below; it would open the door for Mali-Météo to consider carefully the staff profile it needs to provide for increasingly specialized weather-water-climate-environmental data and analysis.

**Option #3: Encourage Private Sector Diversification of Meteorological Services.** In order to capitalize on the skills and passions of retired staff, encourage existing staff approaching retirement to set up a private consulting firm of ex-Mali-Météo staff who sell technical services. The talent pool of retired staff ought to be utilized in some fashion. Private sector consulting firms can play complementary roles to Mali-Météo by analyzing weather and climate data for donor projects and private firms like engineering companies. Creation of competition between Mali-Météo and private sector firms offering analytical services would help ensure price competitiveness and quality control. Domination of the market by a parastatal agency thus could be avoided.

The question could be raised about whether encouragement of private sector competition would undermine Mali-Météo's cost recovery. Certainly, this could happen if Mali-Météo fails to hire a new generation of qualified staff capable of offering high quality analysis; however, the market for weather data analysis may be much larger than what Mali-Météo is able to handle alone. The agency should focus its limited resources primarily on collecting high quality primary data from the network of national weather stations, selling this data to government services providers and the private sector, and providing archival data to the public for analytical purposes. The private sector of meteorological specialists would need to purchase the data from Mali-Météo, but would add value through high quality data interpretation and dissemination to clients in the public and private domains.

**Option #4: Expand weather station network.** The WMO norms and regulations require optimal coverage of synoptic observation and upper air observation stations, as indicated in the text box on this page. At this time, Mali clearly cannot afford to establish and maintain this type of dense network, especially when vast parts of the country are deserts where access and security likely will remain low for the coming years. It is unlikely that all recommendations could be carried out at once; instead, in the near future Mali-Météo needs to set up a consultative process with its stakeholders to determine priority investments based on priority needs, operational costs, and security considerations. That said, the ARCC assessment team recommends the following for the expansion of weather observation capacity within Mali based upon the recommendations of team member Mohammed Boulahya, meteorologist and former director of ACMAD.

Please note that these technical recommendations regarding the scope of rehabilitation and expansion of the Mali-Météo network of observation stations may already have been integrated into discussions regarding future World Bank financing through the *Projet de Résilience face aux Catastrophes dans le Sahel* (P148659), but the ARCC assessment team is not privy to specifics. See Figure 24 for some indications of support. Also note that the question of how to cover the recurrent costs of an expanded weather collection infrastructure is intimately linked to expanding the capacity of Mali-Météo to sell high quality data and analysis to different users – an issue discussed in more detail below.

#### WMO NORMS AND REGULATIONS

- **Synoptic Observation Stations:** Grid coverage of 150 km apart, not more than 250 km apart
- **Upper Air Observation Station:** Every 250 km and not more than 500 km
- **Mali Situation:** With a total land surface of 1.24 million km<sup>2</sup>, 30-60 synoptic surface stations and five to 10 Upper Air Observation Stations needed

Source: WMO, 2013



- **Meteorological Satellite Receiving Station:** One station per regional capital (eight regions) capable of receiving a full suite of weather information from regional and international weather services. Pilot the first one in a highly vulnerable area like Mopti. One such station presently is located at the Mali-Météo headquarters; another is located at the Bamako-Sénou airport. The available information from these stations should feed into regional weather reporting and emergency alerts through local radio stations as well as into the Civil Defense systems found throughout the country. Mali-Météo would need to recruit staff to ensure that this data is analyzed and transmitted to public and private users within each region.
- **Weather Radar Station:** Six to eight radar stations to cover the northernmost desert regions of Mali that are highly vulnerable to flash flooding and where it is very costly to obtain point measurements. At this time, there are three functional radars, but these operate three months per year; the duration should be expanded to a full six months, since the start and end of the rainy seasons are now so variable and unpredictable. The Gao radar site should be rehabilitated in order to feed into weather reporting for pastoralist communities.
- **Synoptic Surface Observation Stations:** About 40 stations are needed for the country and especially in the more densely populated areas of the country in higher rainfall areas. Out of the 19 synoptic surface stations presently in the country, only 13 are currently functional. All of these stations should be equipped with modern and highly robust weather collection instruments based on continuous electronic transmission of data through the current cell phone network. However, each station should be equipped with a backup system based on manual collection of key weather parameters and transmission of data through SSB (BLU) radios in case of breakdowns in the commercial telecommunication systems (such breakdowns could occur in severe weather situations at a time when continuous reporting will be crucial). As noted elsewhere, stations equipped with electronic weather information technologies should be piloted initially and then, if successful, rolled out throughout the country.
- **Principal Agro-Climatic Stations:** About 40 of these stations are needed to cover the country adequately. Currently there are 19 in the network, but only 12 are functional. Ideally, there should be five stations per region in the country. These also should be equipped with modern weather measuring units (e.g., Davis Instruments Weather Stations), and data should be transmitted by the cell phone network but with more classical backup systems in place. The standard manual weather information systems cost about \$62,000 per station, as estimated by Mali-Météo. Electronic weather collection stations such as at the Manantali dam are increasingly used in Mali to generate continuous data on a 24/7 basis. These stations may cost about \$2,000 each (without solar system) assuming that data transmission would occur through the cell phone network.<sup>19</sup>
- **Secondary Agro-Climatic Stations:** 35 stations are currently functional at this time, but they only collect rainfall measurements. If the Synoptic and Principal Agro-Climatic stations are rehabilitated and established as suggested above, there would be no need to expand this network during the next five years. Rather, emphasis should be placed on updating equipment and

---

<sup>19</sup> Electronic weather stations like the Davis Instrument Vantage Pro 2 (wireless with a 24-hour solar-powered fan for ventilation) cost about \$1,200. Transport to Mali plus some spare parts might cost \$2,000/unit. If cell phone service existed in the locality, data could be transmitted through the network at a negotiated commercial rate. This example is an illustrative case and by no means implies endorsement by the ARCC Mali Institutional Assessment team; rather, pilot testing is required of any new system chosen through competitive procurement.



telecommunications systems so that real-time information can be reported out to users like farmers and pastoralists.

- **Rainfall Stations:** At this time, there are 214 locations where rainfall measurements are collected on a quasi-voluntary basis. Mali-Météo should work with these partners to renew the equipment used to collect these measurements. Mali-Météo should strive to set up at least 700 stations, one per district (administrative locality/circle) equipped with more robust rain gauges than the SIMPLAST farmers' rainfall gauges. Transmission of basic weather data to Mali-Météo headquarters should pass through the increasingly widespread cell phone network. Improved coverage of rainfall data alone is a major parameter for agricultural uses and the calibration of weather radars and satellite measures.
- **Farmer Rain Gauges:** Farmer rain gauges, like those SIMPLAST fabricates and sells, should be made more available for purchase by anyone, especially farmers and pastoralists who purchase agricultural inputs (seeds and fertilizers) through small shops. SIMPLAST can be encouraged to more aggressively distribute rain gauges through its existing nation-wide commercial network and also through agricultural supply centers and service providers. Mali-Météo needs to reestablish its communication and outreach campaign on the utility of using rain gauges to help farmers better manage weather information provided through public media and advisory services.

### 3.5.3 Coordination

The Mali-Météo agency interacts with ministries and agencies like AEDD. The extensive government restructuring following the civil disturbances of 2012/2013 has amplified the ongoing process at AEDD of clarifying its institutional roles and responsibilities.

**Option #1: Clarification of Mali-Météo Institutional Mandate:** Improve inter-agency working relations between Mali-Météo and AEDD in order to strengthen analysis of the evolution of climatic conditions in Mali and contribute more effectively to climate modeling scenarios. Mali-Météo is the agency in Mali with a mandate to initiate, develop, or validate climate scenarios, and to interpret scientific data in support of sectorial needs. AEDD has neither the mandate nor the capacity to carry out this type of analysis.

**Option #2: Coordinate Support to the National Weather Monitoring Network.** As described above, Mali-Météo must improve the national weather monitoring systems throughout the country and linkages with national and international meteorological networks. International financing institutions need to coordinate the expected contribution of services and equipment among themselves. Since the expected World Bank *Projet de résilience face aux catastrophes* (P148659) appears to be the most significant contributor to the rejuvenation of Mali-Météo, it may bear the primary responsibility of coordination with other supporting institutions. See Figure 24 for a summary of the major components of the program. Mali-Météo should be assisted with targeted technical inputs to prepare funding proposals for the Mali Climate Fund in order to repair and sustain Mali's weather-water-climate and agro-meteorological stations.

**Option #3: Establish a Climate Sciences Committee:** While recognizing that many national and international structures are carrying out climate-related research and analysis, Mali-Météo should establish a Climate Sciences Committee to assure coordination of meteorological research on Mali carried out by national and international universities and research centers. Mali-Météo needs to expand its own staff capacity to keep abreast of research by regional and international bodies on Mali climate change and weather issues while also seeking to support Malian research and academic institutions. Assignment of Mali-Météo staff to this committee should be determined by the internal capacity



improvement plan described above. Young professionals brought into the agency might be best suited to work on this committee because it would open up networking and learning opportunities. The near-term output for the committee would be to map out who is doing what on meteorological research in Mali and to feed this information into AEDD's database for broader public outreach. AEDD and Mali-Météo could use this opportunity to develop a stronger working relationship, since both institutions are interested in using meteorological information for policy-making purposes.

**Option #4: Promote Ethos of Fee-for-Service Payments:** Despite the perception many Malian and international policy makers have that the provision of meteorological services should be a public good, the harsh reality is that neither the Mali-Météo nor the Government of Mali can cover the high recurrent costs of meteorological services. Around the world, national weather services are increasingly privatized for better or worse. The national weather service of the United Kingdom is well on its way to privatization, and since 1999, the national weather service of Tanzania has functioned as an agency similar to Mali-Météo. In the United States, federal subsidies to the national weather collection agencies have been severely reduced, yet demand for accurate prediction of weather is increasing, as it is for robust climate modeling, which depends on long historical time series.

The ARCC Mali Institutional Assessment team and the Agricultural Innovations assessment team found that multi-lateral and bilateral organizations and NGOs were willing to pay for timely and high quality weather information. Already, the private sector (primarily consulting and engineering firms) pays for Mali-Météo services. Yet some civil society organizations and NGOs are frustrated with the fee-for-service mandate and believe that the state and international donor organizations should support weather services as a public service. A vigorous and realistic debate needs to be launched in Mali. Who will pay for high quality meteorological data collection and analysis in an age of fickle subsidies from national and international government sources? The Board of Governors of Mali-Météo should be encouraged to further promote the key role of the agency as a provider of services to both the public and private sectors.

### 3.5.4 Information Management

The national and international weather services are increasingly capable of generating an enormous amount of weather-related information. Mali-Météo faces the conundrum that its weather data collection infrastructure is largely out-moded and dilapidated. However, if the infrastructure is improved, systems must be put in place to house, retrieve, analyze, and communicate climate-related, digitally based information to the wide array of users within the national and international spheres.

**Option #1: Improve Computing and Data Management Capacity.** Build up the capacity of Mali-Météo staff to carry out climate modeling and provide tailored services at the national, regional, and local levels. Build up the capacity of a new generation of Malian meteorologists to carry out climate analysis by providing scholarships for students and young professionals within Mali-Météo to obtain specialized academic training. Training a new generation of staff will take time, as specialized degree programs take from two to four years to complete.

**FIGURE 23. NEW SIGNAGE AT SOTUBA AGRO-CLIMATIC STATION**



Villagers passing by the agro-climatic station at Sotuba ask for daily updates. Rehabilitation signage costs little and can go a long way in rebuilding the image of Mali-Météo.

Source: Mohammed Boulahya



After acquiring these degrees, this new generation must be provided with good data and computing equipment to do their job.

**Option #2: Institute Cost-Benefit and Impact Evaluation Analyses.** Initiate cost-benefit assessments to estimate and justify the financial investments of weather data to rural and urban beneficiaries. Ideally, the World Bank is carrying out this type of analysis in preparation for its investment in the rehabilitation of Mali-Météo's weather station infrastructure. Similarly, impact evaluations of new programmatic initiatives should be tested. The University of South Carolina's current impact evaluation of the Agro-Meteorological Advisory Program illustrates the utility of carrying out assessments to help redesign a key element of Mali-Météo's outreach programs.

**Option #3: Expand Communication and Outreach.** Following this year's Governing Board resolution, the Mali-Météo is committed to establishing a Weather Services Center that would produce weather reports and other outreach services. This much-needed, notable step will reassert Mali-Météo's role as a service provider. International donor expertise could be usefully channeled to this center to help it develop surveys of products the general public most need and to develop a communications and outreach strategy and action plan. This plan should be one of the first activities of the newly formed network of producers and users of meteorological information (*Cadre national des services climatologiques* [CNSC]). The communication and outreach strategy should consist of a Customer Service Charter (see Option #5 under Institutional Sustainability below), like the one in Tanzania, to help focus the mission of the Weather Services Center.

Mali-Météo invests considerable resources in staffing the synoptic and agro-climatic stations. The mission of these stations at regional and sub-regional centers should expand with the goal to become centers for disseminating weather- and climate-related information to the general public through local radio stations. However, expansion of the network of weather stations should be contingent upon developing a sophisticated but realistic business plan leading to cost recovery for system expansion. Rehabilitation and expansion of the network does not necessarily lead to increased personnel and management costs; rather, if weather stations became increasingly automated, staffing needs could be dramatically reduced. Financial modeling needs to be carried out to find the balance between system expansion and costs of operations. Various measures must be found to handle recurrent staffing costs. For instance, automated weather station maintenance could be sub-contracted out to the private sector, thereby reducing reliance on Mali-Météo personnel. At the same time — once Professor Ed Carr's impact evaluation study is completed — Mali-Météo should redefine the roles and functions of the GTPA in order to better define how to work with rural farming and pastoralist populations.

At a minimum, the weather stations should provide passersby with key weather information such as that of the recently rehabilitated signage at the agro-climatic station at Sotouba, a public services outreach initiative launched by the now-deceased Mama Konaté in the 1990s (see Figure 23).

### 3.5.5 Climate Risk Reduction

**Option #1: Rehabilitate Weather Stations.** Continue to strengthen the farmer rain gauge system of measuring, analysis, and dissemination of local rainfall data. Rebuild all the weather-water-climate networks and build maintenance and quality control systems (see Tables 3 and 5 for the list and status of these stations). As discussed, an independent assessment of the costs of rehabilitating and modernizing these sites must be carried out.

**Option #2: Build the Capacity of Mali-Météo Technical Staff to Carry Out Climate Change Analysis.** Strengthen Mali-Météo's data analysis and prediction systems by hiring new staff and re-training present staff. The retirement of present staff with relatively high salaries opens the door to hire



younger, less expensive, but newly trained meteorologists. Mali-Météo needs to strengthen its capacity to provide high quality technical advice to government and the public-at-large on how to respond to climate change and sporadic extreme weather and water events. International donors could support institutional training and mentoring programs between the Mali-Météo and universities and meteorological services in developed countries. Mali-Météo does not have the financial means to carry out extensive climatic modeling like counterparts in wealthier industrialized countries, but it can improve its own capacity to interpret the implications of climate change predictions for the general public and agencies like AEDD. External support to Mali-Météo could include sabbaticals for faculty or inter-agency exchanges with the Mali-Météo as well as specific technical assistance to meet needs expressed in a staff training plan. Even if measures are put in place to link Mali-Météo headquarters with the databases of the ASECNA-managed synoptic stations, the agency needs more trained staff to expand prediction of severe weather events – ones similar in intensity to the flash flooding in Bamako of August 28-September 3, 2013.

**Option #3: Diversify Climate Services in Mali.** As noted elsewhere, Mali-Météo needs to prepare for the imminent retirement of key technical staff. At the same time, retired staff should consider opportunities to create small enterprises providing meteorological services and expertise to the Mali-Météo itself and to other public and private sector actors.

### 3.5.6 Institutional Sustainability

The institutional future of Mali-Météo is far from secured. While the recommendations above are required to rebuild the agency, investments will serve no purpose unless accompanied by measures to cover recurrent costs. Mali-Météo ought not to expect the international community or the Government of Mali to invest perpetually in ongoing maintenance of the infrastructure of weather stations, personnel, and outreach. The fickleness of the international development community and the state has been proven time after time. For this reason, the ARCC Mali Institutional Assessment team most strongly recommends that Mali-Météo implement measures not only to obtain investment capital to rebuild and expand the network of weather stations, information management, analytical services, and public outreach, but more importantly, to develop strategies for cost recovery.

**Option #1: Promote a Business Strategy and Action Plan.** Prioritize development of a business strategy and action plan to capture all potential resources available from the public sector, private users, and the international meteorological community. Engage an external firm of finance and marketing specialists to assist the *Conseil d'Administration* to establish strategies for resource mobilization in developing this new business model. Among the many priorities presented in this assessment, the ARCC Mali Institutional Assessment team for Mali-Météo places the highest priority on this recommendation.

Mali-Météo is on the right track to charge fees for databases and analysis generated by the agency to government agencies, consulting firms, and private users on a pro-rated basis. Students and academics receive climate data for free if requested for training and research purposes. Other exceptions are possible on a case-by-case basis. The assessment team concluded that a market for high quality meteorological information does exist within Mali. Various institutions need viable weather and climate information to help assess risks and opportunities. However, Mali-Météo urgently needs skilled external assistance to help it identify, capture, and monetize the market for its services – services for which the following institutions can pay:

- **Banks and Insurance Companies:** The ARCC assessment team consulted insurance companies and banks. These companies expressed a strong need for long-term climate data for specific regions in Mali where banks invest in real estate and agriculture. Banks are willing to pay for weather data and analysis but are skeptical of Mali-Météo's actual capacity to provide needed information. Similarly,



insurance companies expressed a willingness to consider in more depth how climate change may affect their business portfolio. If agricultural index funds were put in place through Malian insurance companies, they certainly would need to purchase reliable data and analytical services.

- *Cell Phone Companies:* With Mali-Météo, cell phone companies in Mali have explored ways to set up dial-up weather services. Unfortunately, Mali-Météo staff have not had the technical and marketing expertise to convert these general discussions into concrete action. Targeted technical assistance might turn general ideas into a profitable service for both the cell phone companies and Mali-Météo.
- *Consulting and Engineering Firms:* The private sector purchases historical data on rainfall, temperature, wind patterns, and river flow from Mali-Météo in order to calculate design specifications for infrastructure like buildings, dams, irrigation systems, and roads. These companies can pass on the costs of weather data and analysis to the investor, but they require good data.
- *International Donors:* International donors need meteorological data to design social safety net programs. While national governments and international donors vigorously debate the role of the state in supporting social safety nets, calculations of risks are central to the debate. Risk assessments require a full picture of weather and climate data that should be generated by both national weather services and regional and international climate agencies.<sup>20</sup> Similarly, agencies like USAID are exploring “index insurance” to help farmers manage volatile weather affecting crop production (USAID, 2013). Whether a social safety net or an agricultural index insurance scheme, all plans require accurate and timely weather information and analysis from national, regional, and international services.
- *Parastatals:* The ANAC national aviation agency could be a major purchaser of weather information if the internal airline industry were to expand more throughout the country. Similarly, agricultural parastatals like the CMDT are already major users of Mali-Météo weather information services.

**Option #2: Support Public-Private Partnerships for Meteorological Services.** Develop new public-private partnerships to add value to the climate services Mali Météo offers. Work closely with the cell phone companies to develop new weather information services for sale to clients. Carry out detailed market studies to determine the type of weather information for which clients might pay as part of a dial-up service for weather forecasts for particular regions in Mali. Cell phone companies could contract the Mali-Météo to provide weather bulletins suited for various parts of the country. Costs for this service could be passed on to users of the service or provided as a public service to subscribers. A public-private partnership might cover the costs of rehabilitation of some strategically located weather stations needed for generating weather forecasts.

**Option #3: Prepare Mali-Météo proposals for submission to the AEDD Climate Fund.** The Climate Fund managed by AEDD is well suited to provide targeted financial support to Mali-Météo. Structure the proposal around the strategic importance of the agency in generating timely and accurate weather data on a variety of parameters while protecting national weather archives essential for robust climate changing modeling. The agency should closely monitor this fund and prepare proposals for funding the rehabilitation of weather stations and the revitalization of the Agro-Meteorological Advisory Program for one region of high vulnerability to climate change. The Mopti Region may be the most appropriate in light of key findings and recommendations from the ARCC Mali Vulnerability Assessment.

---

<sup>20</sup> Literature on the debate is well summarized in Monchuk (2014).

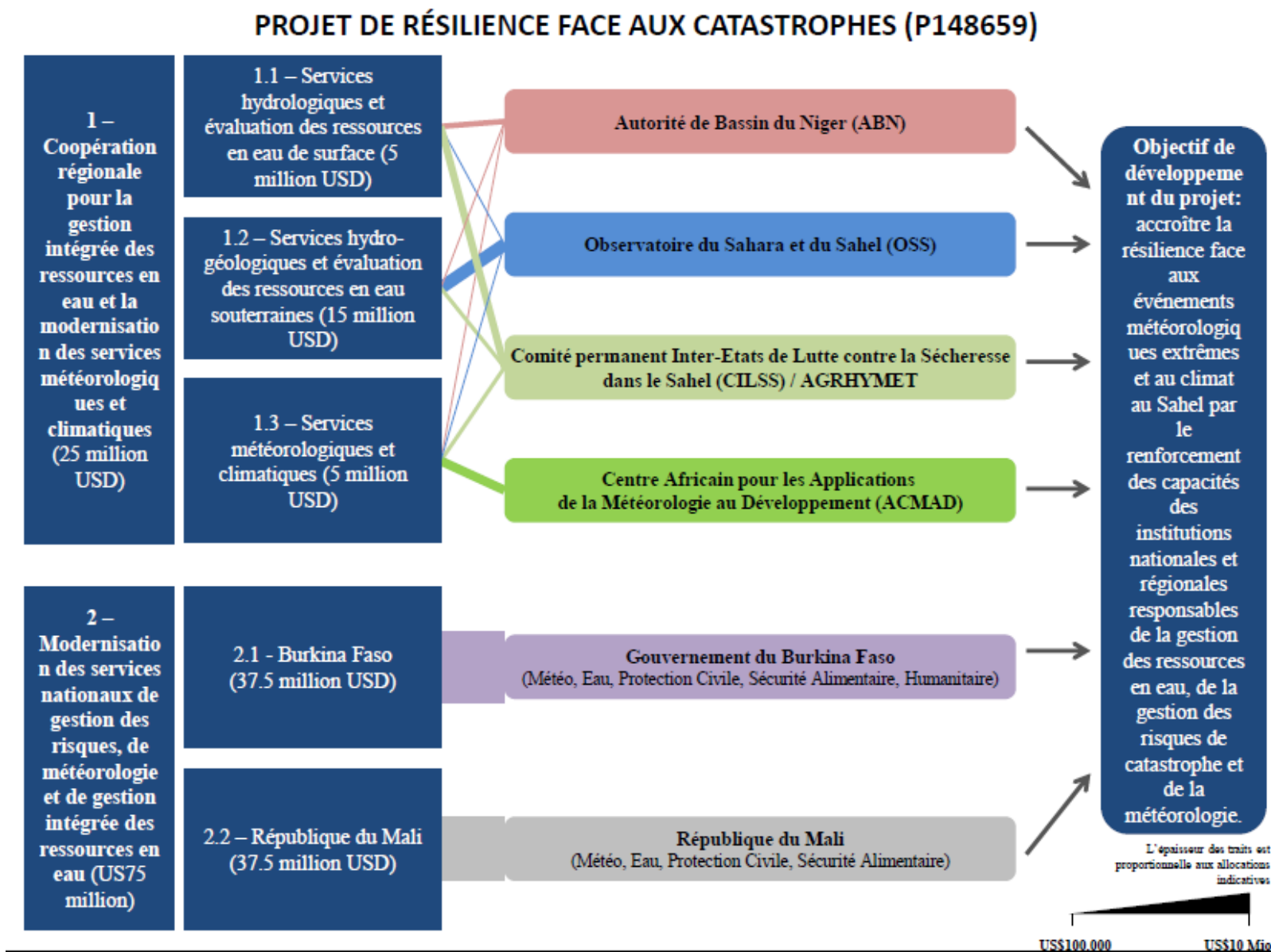


**Option #5: Develop and Disseminate a Customer Service Charter.** Mali-Météo is aware of its mandate to provide climate and weather services to the public, but it needs to develop a Customer Service Charter that clearly establishes norms and standards for the types of services it offers to various clients. The service charter should be accompanied by a baseline assessment of current perceptions of Mali-Météo efficacy, through which improvements can be measured over time. This Customer Service Charter should become the reference point by which the value added by investments in infrastructure, personnel, and outreach are measured.

Mali-Météo is not the only meteorological service in Africa that has become an autonomous services delivery agency for weather information and analysis. The Tanzania Meteorological Agency (TMA) has gone through much the same history as Mali-Météo. In 1999, the agency was created with much the same mandate of Mali-Météo. The Client Service Charter is a 10-page public document that spells out in simple language the vision, mission, core values, and various services offered by the agency. The TMA vision is “to stand out as a centre of excellence in accelerating the national development vision through provision of world class meteorological services by the year 2015,” and its mission is “to provide quality, reliable and cost effective meteorological services to meet stakeholders’ expectations thereby contributing to the protection of life, property and national poverty reduction goal.” The core values of the agency are “professionalism, good governance, quality service, team work, timeliness, and customer focus” (TMA, 2008:5). The Tanzanian government assessment of the impact of “semi-independent public institutions that are designed to operate at arm’s length from their parent Ministries” (United Republic of Tanzania, January 2005:iii) shows that services improved, staff became more professional, and state subsidies increased because government confidence in the agencies led to more business.



FIGURE 24. SUMMARY OUTLINE OF WORLD BANK PROJET DE RÉSILIENCE FACE AUX CATASTROPHES





## 4.0 SOURCES

- Agence de l'Environnement et du Développement Durable (AEDD). (n.d.). "Presentation." Retrieved from <http://www.environnement.gov.ml/index.php?page=secretariat-technique-permanent-cigqestp>
- Carr, E. (2013). "Meteo Mali Agrometeorological Program Evaluation: Preliminary Report." Department of Geography, University of South Carolina.
- Davis Instruments. (n.d.) "Vantage Pro2." Retrieved from <http://davisnet.com/weather/products/vantage-pro-professional-weather-stations.asp>
- Dinku, T.; Giannini, A.; Curtis, A.; and Mason, S. (n.d.) "Assessment of Climate Science Used by Direction Nationale de la Météorologie du Mali for provision of Agrometeorological Information to the rural community." International Research Institute for Climate and Society.
- Fonds Climat Mali. (2014). "Plan Stratégique."
- Groupe de Travail Pluridisciplinaire d'Assistance Agro météorologique. (n.d.) *Rapport de Synthèse: Campagne Agricole 2012-2013*.
- ICRISAT; Tketé, A. and Sivakumar, M.V.K., Direction de la Météorologie Nationale, Mali. (1995). "Analyse de la longueur de la saison culturale en fonction de la date de début des pluies au Mali." *Compte rendu des travaux no. 3. Division des Sols et Agroclimatologie*.
- Intercoopération Sahel. (n.d.) "Changement Climatique au Mali: Introduction et développement du thème Changement Climatique dans la Délégation Intercoopération Sahel." Retrieved from [http://www.iisd.org/cristaltool/documents/intercooperation\\_changement\\_climatique\\_mali.pdf](http://www.iisd.org/cristaltool/documents/intercooperation_changement_climatique_mali.pdf)
- International Monetary Fund. (2013). "Mali : Cadre de stratégie pour la croissance et la réduction de la pauvreté." Retrieved from <http://www.imf.org/external/french/pubs/ft/scr/2013/cr13111f.pdf>
- Mali Web. (January 15, 2014). "4ème session du Conseil d'Administration de l'AEDD : 1 milliard 200 millions pour atteindre les objectifs fixes." Retrieved from <http://www.maliweb.net/economie/4eme-session-du-conseil-dadministration-de-laedd-1-milliard-200-millions-pour-atteindre-les-objectifs-fixes-189667.html>
- McSweeney, C; New, M; Lizcano, G. "UNDP Climate Change Country Profiles: Mali." Accessed 16 February, 2012. Retrieved from <http://www.geog.ox.ac.uk/research/climate/projects/undp-cp/index.html?country=Mali&dl=Reports>
- Ministère de la Coopération, ORSTOM, and Météo France. (1994). *Satellite et surveillance du climat: 1986-1994 (Afrique et Atlantique intertropicale)*. ORSTOM.
- Monchuk, V. (2014). *Reducing Poverty and Investing in People: The New Role of Safety Nets in Africa*. World Bank.
- MPTFO. (2013). "Mali Climate Fund." Retrieved from <http://mptf.undp.org/factsheet/fund/3ML00>
- OECD. (n.d.). "Paris Declaration and Accra Agenda for Action." Retrieved from <http://www.oecd.org/dac/effectiveness/parisdeclarationandaccraagendaforaction.htm>



- Observatoire du Sahara et du Sahel. Observatoire du Sahara et du Sahel. (n.d.) "Etat De Référence des Observatoires du Dispositif National de Surveillance Environnementale Au Mali." DNSE/Malil. Retrieved from <http://www.oss-online.org/sites/default/files/fichier/01.pdf>
- République du Mali, Ministère de L'Environnement Et De L'assainissement, Direction Nationale de la Conservation de la Nature. Initiative Pauvreté-Environnement (IPE-Mali). (2009). *Evaluation Intégrée des Ecosystèmes : Cas De La Region De Mopti Au Mali. Rapport Provisoire.*
- République du Mali, Ministère de l'Environnement et de l'Assainissement. (December 2011). *Seconde Communication Nationale du Mali sur les Changements Climatiques.* UNDP/Global Environmental Facility.
- République du Mali, Présidence de la République. (June 1999). Etude Nationale Prospective "Mali 2025."
- Sveiven, S. (November 2010). "Are the European financial institutions climate proofing their investments?" IVM Institute for Environmental Studies.
- Tanzania Meteorological Agency. (February 2008). Client Services Charter.
- United Republic Of Tanzania, President's Office Public Service Management, Public Service Reform Programme, Monitoring and Evaluation Unit. (January 2005). "Executive Agencies: Do they perform better?"
- United Nations Development Program. (2013.) "Mali Climate Fund." Available at: [mptf.undp.org/factsheet/fund/3ML00](http://mptf.undp.org/factsheet/fund/3ML00)
- USAID. (2013). "Insurance Innovations for Development and Adaptation: Frequently Asked Questions." Retrieved from <http://www.usaid.gov/sites/default/files/documents/1865/CCRD-IndexInsuranceFactSheet.pdf>
- Winterbottom, R.; Reij, C.; Garrity D., Glover, J.; Hellums, D.; Mcgahuey, M.; and Scherr, S. (2013). "Improving Land and Water Management." Washington, D.C.: World Resources Institute.



# ANNEX I. CONTACTS

TABLE 6. AEDD AND MALI METEO CONTACTS

INSTITUTIONS	MALI-MÉTÉO	AEDD
Client	<ul style="list-style-type: none"> <li>• Director General and Division heads</li> <li>• Technical staff, communications specialist, and press network</li> <li>• Synoptic and upper-air station at ASECNA Bamako airport</li> <li>• Agro-meteorological station at Sotuba</li> </ul>	<ul style="list-style-type: none"> <li>• Director General and Division heads</li> <li>• Technical and administrative staff</li> <li>• International expert advisor</li> <li>• Ministry of Agriculture (Cellule de Planification et Statistique)</li> <li>• Direction of Water and Forests</li> <li>• Ministry of the Environment (AEDD <i>Conseil d'Administration</i> member)</li> </ul>
Private Sector	<ul style="list-style-type: none"> <li>• Retail seed stores</li> <li>• Banque Nationale de Développement Agricole</li> <li>• Compagnie d'Assurance LAFIA S.A.</li> <li>• SIMPLAST (rainfall gauge manufacturer)</li> <li>• Orange and Mali Telecom</li> </ul>	<ul style="list-style-type: none"> <li>• Compagnie d'Assurance LAFIA S.A.</li> <li>• Banque Nationale de Développement Agricole</li> </ul>



Civil Society	<ul style="list-style-type: none"> <li>• Assemblée Permanente des Chambres de Commerce d'Agriculture au Mali (APCAM)</li> <li>• Focus groups with NGOs, government agents, and farmers performed by the ARCC Adaptive Practices Organizational Survey and Focus Group assessment</li> </ul>	<ul style="list-style-type: none"> <li>• SECO – ONG</li> <li>• Mali Folke Center</li> <li>• APCAM</li> </ul>
Academia	<ul style="list-style-type: none"> <li>• Institut d'Economie Polytechnique Rural (IPER) at Katioubougou</li> </ul>	<ul style="list-style-type: none"> <li>• Institut d'Economie Polytechnique Rural (IER) at Katioubougou</li> </ul>
Donors	<ul style="list-style-type: none"> <li>• USAID</li> <li>• UNDP</li> <li>• Embassy of Sweden</li> <li>• AGCC/EU</li> </ul>	<ul style="list-style-type: none"> <li>• USAID</li> <li>• UNDP</li> <li>• Embassy of Sweden</li> <li>• AGCC/EU</li> </ul>



# ANNEX II. MALI CLIMATE FUND

AEDD has focused much of its energy on setting up the Mali Climate Fund under the Multi-Partner Trust Fund Office of the United Nations Development Programme (UNDP). The Fund has received an initial contribution from the Swedish Government. AEDD has taken a strategic path to ensure its long-term institutional viability by focusing on building a mechanism to generate financial resources for climate adaptation and mitigation.

AEDD's institutional reputation hinges on the rigorous design and implementation of the Mali Climate Fund. However, the future of AEDD is very much at risk because the Government of Mali has not yet approved the various governing texts of the Mali Climate Fund. In light of the recent political past in Mali, this lack of action is not surprising. There is also a risk that the Swedish government will withdraw its support for the Mali Climate Fund due to the slow start-up process. Project proposal submissions and disbursements are scheduled to commence in February and March of 2014. By mid-March, the management committee had met for the first time, communication and outreach activities were started, application procedures were finalized, and a draft work plan developed.<sup>21</sup>

## STRATEGIC VISION FOR MALI CLIMATE FUND

The purpose of the Mali Climate Fund is “to increase the resilience of ecological, economic and social systems to climate change by incorporating priority policies and initiatives in the most vulnerable sectors. The reduction of greenhouse gas emissions by promoting win-win strategies for clean development is a secondary objective, although Mali is country with low carbon emissions. Improving capacities for national research is also emphasized as a means to more effectively manage risks and the impact of climate change. Improving capacities for national research is also emphasized as a means to more effectively manage risks and the impact of climate change.” (United Nations Development Programme, 2014)

AEDD is under scrutiny to make the Mali Climate Fund work, and complaints are already being raised that the fund will exclude certain actors like Malian NGOs. There are concerns that only institutions with a strong capacity to submit quality proposals in a short period of time will benefit the most from the new funding opportunity. For instance, the national directorates and agencies in Mali have the capacity to submit strong proposals. So, too, do United Nations participating organizations. On the other hand, civil society organizations, small NGOs, and the private sector may lack the time and the capacity to generate strong proposals.

The Government of Mali has identified as a top priority the establishment of the Mali Climate Fund to serve as the engine for financing national- and local-level actions to adapt and respond to climate change. The table below summarizes the key elements of the Climate Fund as currently conceived.

---

<sup>21</sup> The 2014 draft work plan spells out in considerable detail the planned activities for the first year. See: Fonds Climat Mali. “Plan Stratégique,” 2014.



## KEY ELEMENTS OF THE MALI CLIMATE FUND

The Mali Climate Fund will be an essential tool for mobilizing, accessing, sequencing, and combining domestic and international as well as public and private financing sources. It allows the Government of Mali to directly access international climate funds (for example, the Adaptation Fund, the 'Fast Start' financing, the Global Green Fund, etc.) and bilateral funds, jointly managing the Fund with the United Nations through its Multi-Partner Trust Fund Office (MPTF Office). The Fund will be administrated by the UNDP through the MPTF Office in New York.

### Implementing Bodies and Organizations:

A **Governmental Coordination (GC)**, represented by the *Ministère de l'Environnement et l'Assainissement* and governed by the Ministries of Economy and Finance, Foreign Affairs and the secretariat, and AEDD;

The **National Entities (NE)**, in charge of executing programs financed by the Fund;

The **United Nations participating organizations**, involved in the reinforcement of capacities and the implementation of approved programs; and

The **Bureau FMP of the PNUD as the Administrative Agent**, which administers the funds for the Mali Climate Fund.

### The Operational Modalities

The operational modalities will allow the government to supervise and guide the coordinated execution of activities in the areas of Fund operation according to its development schedule.

The Fund's resources will be used to finance the direct and indirect costs of the programs managed by the National Entities, participating organizations of the United Nations, and the cost of the Administrative Agent. The detail of these programs, including their budgets and the implementation partners (national entities, NGO/civil society organizations, intergovernmental organizations), will be defined in the project documents that the Technical Secretariat (TS) will review and the Management Committee (MC) will approve.

The Fund will be directed by an MC presided by the *Ministère de l'Environnement et l'Assainissement*. The members of the MC will include five government representatives (in addition to the President); five representatives of technical and financial partners (chosen by the Group of PTFs through the PTF/Leaders of Thematic Groups concerned with climate change); three representatives of civil society; the Residing Coordinator of the UN's System; and the Representative of the Executive Coordinator of the Multi-Partners Fund Bureau. Each entity that contributed to the fund can also participate in the MC's deliberations upon request.

The MC can invite other entities as ex-officio members or as observers on the basis of defined criteria.



## INSTITUTIONAL ROLES

**The Technical Secretariat:** AEDD will house the Technical Secretariat, which will be an impartial entity furnishing substantial administrative and technical support to the MC. The Technical Secretariat will be composed of AEDD qualified personnel. When AEDD expresses the need and if financing is approved by the Management Committee, supplementary personnel that the UNDP mobilizes will support this group. It will provide assessments of high quality programs, capacity assessments, and program performance as well as other analyses if needed. The TS will fulfill five functions under a single management structure:

- administrative support;
- support for analysis of program proposals;
- support for monitoring and evaluation;
- support for control and monitoring-reporting-verification (MRV); and
- external communication.

The TS will also ensure the monitoring of MC meetings as well as coordination between the MC, the GC, AEDD, and the UNDP as the Administrative Agent.

**The GC** body is responsible for the development, implementation, and control and evaluation of the Fund's portfolio implemented by the National Entities.

**The National Entities** will prepare technical and financial proposals and will submit them to the MC for approval following review by the TS. Once financing is approved, the Administrative Agent (UNDP) will directly transfer the funds to conduct activities according to the National Regulatory Framework.

**The United Nations' participating organizations** will prepare and submit to AEDD, for possible approval by the MC, proposals in their areas of technical and thematic expertise. On the basis of instruction from the MC, the Administrative Agent will transfer the approved funds to the United Nations' competent participating organizations, which will conduct the activities in compliance with their own rules, regulations, policies, and procedures.

### Development of a program proposal

The process and criteria for determining the composition of a portfolio and for authorizing the development of individual programs shall be determined by the MC and shall comply with the Fund's policies, priorities, and procedures. The program proposals shall use a standard form to be prepared by the TS.

The TS shall conduct an inclusive, independent, and impartial technical evaluation of each program proposal. The technical evaluation may be done directly by the TS personnel. Otherwise, the TS can contract the services of a competent national or international entity.

### Who can contribute to the Climate Fund?

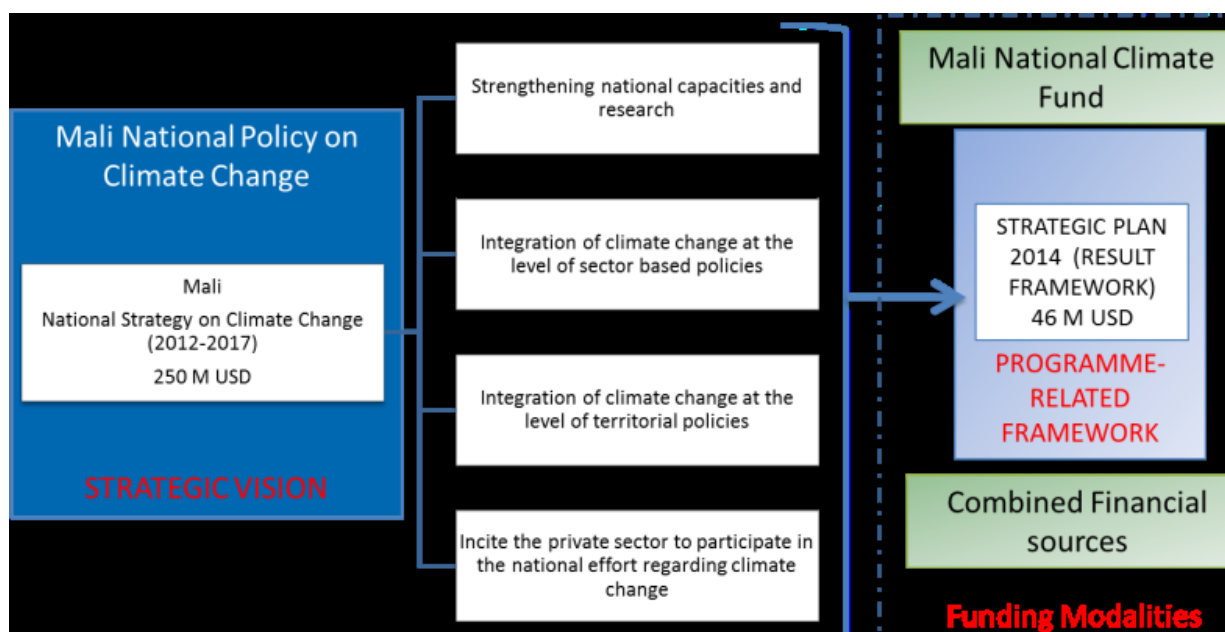
The Mali Climate Fund will receive contributions from a large range of partners in development, from developed and developing countries as well as from intergovernmental organizations, from NGOs, from private foundations, from private sector organizations, and individuals. The partners that desire to contribute are invited to sign a Standard Administrative Arrangement with the MPTF bureau as Administrative Agent.

For more information, visit: <http://mptf.undp.org/factsheet/fund/3ML00>



This Climate Fund financial instrument was created on January 26, 2012 with the support of the MPTF Office of the UNDP.<sup>22</sup> The UNDP will provide fund administration, management, and other support services related to the establishment and management of the Fund for the first five years.

**FIGURE 25. MALI CLIMATE FUND STRATEGIC VISION**



<sup>22</sup> The draft protocol of accord between the UNDEP and the Malian government is available at: [mdtf.undp.org/document/download/8093](http://mdtf.undp.org/document/download/8093)



To date, the Swedish government has committed 35 million kroners, the equivalent of 7 billion CFA (about \$6 million), which will be paid in two installments. The first installment is ready for disbursement, and the rest shall be distributed on August 31, 2014. Sweden considers this contribution to be "seed money" to encourage other donors to contribute to the fund. The Government of Mali and the UNDP are in discussions with Norway and Germany for possible additions.

The communications and outreach plan for the Climate Fund has not yet been written, so most future bidders as well as future contributors to the fund are not informed of operating procedures. For the Climate Fund to gain legitimacy, it must carry out a strong communications and outreach campaign. To this end, it is necessary that all information regarding contributors, management and access procedures, as well as disbursements be available to the public through the website of the *Ministère de l'Environnement et l'Aissainissement* and also through various public forums that AEDD should set up not only in Bamako but also in the regions. AEDD faces a conundrum if it widely publicizes the fund and the initial donor and government contributions remain small. Expectations will be raised for financing, only to be dashed once again by the appearance of false promises.

The ARCC Mali Institutional Assessment team interviewed numerous national stakeholders who view the Mali Climate Fund as a good opportunity for Mali to improve the resilience of ecosystems and of communities against the effects of climate change. But in referring to the example of the Clean Development Mechanism (CDM), they worry about the complexity of disbursement procedures and the government's lack of ability to mobilize supplemental resources for the Mali Climate Fund. Most of the people interviewed note that the fund is indeed a way to increase Mali's national ownership of projects funded in the field. AEDD could increase its capacity to deal with programmatic redundancies and lack of inter-sectorial coordination. The Mali Climate Fund could be an integrating mechanism that forces harmonization of policies, programs, and projects not only within government but among external recipient bodies. In effect, the Mali Climate Fund represents the principles of the 2005 Paris Declaration and 2008 Accra Agenda for Action – ownership, alignment, harmonization, results, and mutual accountability.

AEDD confronts several major challenges in setting up and operationalizing the Mali Climate Fund. From the perspective of the ARCC Mali Institutional Assessment team, the following factors may impede the eventual implementation of the Climate Fund.

- **Communication:** The Climate Fund is not sufficiently known about among stakeholders inside and outside Mali. Communication is limited, because AEDD itself was affected by the political crisis of 2012/2013. This crisis interfered with the setup of communication and outreach

## KEY PRINCIPLES OF THE PARIS DECLARATION

- **Ownership:** Developing countries set their own strategies for poverty reduction, improve their institutions, and tackle corruption.
- **Alignment:** Donor countries align behind these objectives and use local systems.
- **Harmonization:** Donor countries coordinate, simplify procedures, and share information to avoid duplication.
- **Results:** Developing countries and donors shift focus to development results, and results get measured.
- **Mutual accountability:** Donors and partners are accountable for development results.

Source: OECD. n.d.



protocols.<sup>23</sup>

- **Political Crisis:** The political crisis led to the suspension of donor cooperation with Mali, which to a large degree explains the delays in setting up the fund and especially the mechanisms defining eligibility conditions. To date, neither the MC, meant to play an essential role in the requisite approval procedure, nor the TS are in place.
- **Procedural Complexities:** The administrative procedures of the Climate Fund are complex. Stakeholders are concerned that they will be unable to respond to the procedures set up by the fund. Since the Climate Fund is the first time that such a fund has been launched within a ministry in Mali,<sup>24</sup> it is understandable that great care is going into creating sound procedures. However, even the fund's promoters, who do not read the eligibility conditions the same way, perceive this complexity. A few of them, for example the civil society organizations (NGOs and producer organizations) and those within the private sector, cannot directly tender for the fund; they are not eligible to do so except when linked to a consortia with a governmental entity and/or a United Nations participating organization. On this subject, the Director-General of AEDD straightforwardly notes that "the Fund is open to all the participating national organizations, whether they are government structures, civil society organizations or from the private sector. The only condition is to comply with the seven priority areas which are: research, water, agricultural intensification, diversification of resources for vulnerable households, energy and the forestry resources."<sup>25</sup>
- **Limited Resources:** The United Nations agencies, called United Nations participating organizations, can submit tenders to the Fund, with the condition of being in partnership with a national entity in Mali. With the high cost of overhead and salaries of the administrative structures of the United Nations and Government of Mali, many financial resources might not reach the field.
- **Management Capacity for AEDD:** As a young institution, AEDD does not yet have the resources nor the staff to publicize and monitor the Mali Climate Fund at the regional or local level. However, if the internal management procedures are not worked out, approved, and then communicated to a broader public, AEDD could lose the key to its long-term viability. Under pressure to achieve results, there is little time for AEDD to learn from experience in piloting the Mali Climate Fund. In effect, the ARCC Mali Institutional Assessment team is concerned that at this point, AEDD simply does not have the personnel and technical capacity to measure up to the complex and rightly rigorous requirements of the Climate Fund management framework.<sup>26</sup>

---

<sup>23</sup> The coup d'etat in March 2012 interrupted the moment when the roundtable of potential funders of the Fund should have taken place in New York.

<sup>24</sup> It seems that the only experience of this kind is the Mali Stabilization Fund, classified under the Prime Minister's office.

<sup>25</sup> The finalization of the Fund implementation plan in the present month of February should improve visibility of the Fund, especially the eligibility criteria and the priorities, whether they be sectorial, geographic, or of another type.

<sup>26</sup> An examination of the mandate of the Mali Climate Fund provides an idea of the technical capacities and the financial and accounting management required for implementation. In order to respond to this need, the Swedish cooperation has provided its initial contribution to the framework – 1 million kroner for the reinforcement of AEDD's management capacities.



For these reasons, the Government of Mali may be hesitant to approve the Mali Climate Fund or contribute national matching funds. From the donor perspective, this hesitancy may give the impression of a lack of political will in the government to support the Climate Fund. For now, there is a spirit of wait-and-see among other donors interested in supporting this basket fund so central to the spirit of the Paris Declaration.

In the event that the Mali Climate Fund is established it could be set up to consist of a sub-fund dedicated exclusively to facilitating environmental and climate change adaptation and mitigation at the regional level. Regional Climate Change Plans could be developed to structure the use of funds at this scale. A Regional Climate Fund would open the door for local stakeholder appropriation while raising the consciousness of these actors about local environmental dynamics. A Regional Climate Fund could support activities such as regional vulnerability studies, information and awareness-raising, and preparation and/or review of action plans at the commune level (PDESC). This regional fund also would be a tool for encouraging collective efforts aimed at climate risk management thanks to an integrated regional database (meteorological, hydrological, environmental, and socioeconomic data), which would bring together the different data sets for better decision-making.



**U.S. Agency for International Development**

1300 Pennsylvania Avenue, NW

Washington, D.C., 20523

Tel: (202) 712-0000

Fax: (202) 216-3524

**[www.usaid.gov](http://www.usaid.gov)**